COLUMBIA LIBRARIES OFFSITE
HEALTH SCIENCES RESTRICTED
HR00874817

Serial
A
v.19-20
1879-80
cop. 1

Columbia University
in the City of New York
School of Dental and Oral Surgery

LIBRARY OF
Dr. CARL F. W. BÖDECKER
1846-1912
The gift of
Dr. Henry and Dr. Charles Bödecker
1929

Digitized by the Internet Archive
in 2014

https://archive.org/details/transactionsofam1920amer

TRANSACTIONS

OF THE

AMERICAN DENTAL ASSOCIATION

AT THE

NINETEENTH ANNUAL SESSION,

HELD AT NIAGARA FALLS,

COMMENCING ON THE 5TH OF AUGUST, 1879.

PUBLICATION COMMITTEE.

GEO. H. CUSHING, J. N. CROUSE, GEO. W. KEELY.

CHICAGO:
KNIGHT & LEONARD, PRINTERS.
1880.

DISCLAIMER.

The American Dental Association, although formally accepting and publishing the reports of the various Standing Committees, and the essays read before the Association, holds itself wholly irresponsible for the opinions, theories, or criticisms therein contained, except when otherwise decided by special resolution.—*Constitution.*

CONTENTS.

Disclaimer, - - - - - - - - - - - - - - 2
Officers for 1878–9; 1879–80, - - - - - - - - - - 6
Roll-call, - - - - - - - - - - - - - - 7
Motion adopting Programme, - - - - - - - - - - 9
Vacancies filled in Executive Committee, - - - - - - - 9
Motion of Dr. Hunt, referring President's address, - - - - - 9
Report of Publication Committee, - - - - - - - - - 10
Action thereon, - - - - - - - - - - - - 11
Report of Treasurer, - - - - - - - - - - - - 11
Report on Credentials, - - - - - - - - - - - 14
Report of committee on President's address, - - - - - - 16
Motion of Dr. H. A. Smith on death of Dr. McQuillen, - - 11
Report of committee on same, - - - - - - - - - - 17
Memorial page, - - - - - - - - - - - - 23
Remarks of Dr. Rehwinkel, - - - - - - - - - - 23
Remarks of Dr. Barrett, - - - - - - - - - - - 24
Remarks of Dr. Spalding, - - - - - - - - - - - 24
Remarks of Dr. Stellwagen, - - - - - - - - - - 25
Remarks of Dr. Beck, - - - - - - - - - - - - 25
Remarks of Dr. Atkinson, - - - - - - - - - - 25
Motion of Dr. Peirce for a voluntary subscription, - - - - - 12
Resolutions on Directory by Dr. McNaughton, - - - - - 13
Report of committee on Volunteer Papers, - - - - - - - 13
Motion of Dr. Taft for committee to send dispatches to the press, - 13
Motion of Dr. Hunt to divide report on Education, and action thereon, 14
Resolutions by Dr. McNaughton, - - - - - - - - - 15
Motion of Dr. Dean for extra session, - - - - - - - - - 16
Motion of Dr. Crouse to pay bills, - - - - - - - - - 17
Committee on Directory, - - - - - - - - - - - 17
Motion of Dr. Harlan to appoint committee on National Association, 18
Committee appointed, - - - - - - - - - - - - 18
Resolution of Dr. Stellwagen as to applause, - - - - - - 19
Election of officers and selection of place of next meeting, - - - 19
Motion for members to remain in their seats and to vote open ballots, 19
Motion of Dr. Atkinson, instructing Recording Secretary, - - 19
Motion of Dr. Spalding for Sections to meet, - - - - - - 19
Motion of Dr. Shepard for Sections to meet, - - - - - - 19

Motion of Dr. Hunt, instructing members of Sections, - - - 20
Motion of Dr. Spalding, changing order of calling of Sections, - - 20
Motion instructing Treasurer, - - - - - - - - - 20
Motion of Dr. Stockton — thanks, etc., - - - - - - - 21
Resolutions by Dr. Atkinson on sale of fraudulent diplomas, - - 21
Notice of amendments to Constitution, - - - - - - 21–22
Publication Committee appointed, - - - - - - - - 21
Reorganization of Sections, - - - - - - - - - - 21
President's address, - - - - - - - - - - - - 27
Letter from Dr. George Watt, - - - - - - - - - 29
Reply to same, - - - - - - - - - - - - 32

Reports and Volunteer Papers.

SECTION ONE.

Report by R. Finley Hunt, Chairman, - - - - - - - 33

SECTION TWO.

Report on Education by J. N. Crouse, Chairman, - - - - - 50

SECTION THREE.

Report on Dental Literature by J. Taft, - - - - - - - 74
Report on Nomenclature and Terminology by W. H. Atkinson, Chair'n, 90

SECTION FOUR.

Report on Operative Dentistry by I. J. Wetherbee, Chairman, - - 101
Report on Operative Dentistry by Geo. B. McDonald, of the Section, 106

VOLUNTEER PAPERS.

On Operative Dentistry by Thos. C. Stellwagen, - - - - - 110
On Operative Dentistry by Geo. J. Friedrichs, - - - - - 112

SECTION FIVE.

Report on Physiology by M. S. Dean, Chairman, - - - - - 121
Physiological Observations on the Action of Nitrous Oxide, by Julius G. W. Werner, - - - - - - - - - - - - 126

Discussions.

Artificial Dentistry — discussed by
Dr. Stockton, - - - - - - - - - - - - 33, 41
Dr. J. Taft, - - - - - - - - - - - - 33, 43, 48
Dr. Atkinson, - - - - - - - - - - - - 34
Dr. Essig, - - - - - - - - - - - - 37, 42
Dr. Stellwagen, - - - - - - - - - - - 39, 42
Dr. Butler, - - - - - - - - - - - - 39
Dr. Rehwinkel, - - - - - - - - - - - 40
Dr. McDonald, - - - - - - - - - - 41, 45
Dr. Crouse, - - - - - - - - - - - 42
Dr. Clump, - - - - - - - - - - - - 45
Dr. Barrett, - - - - - - - - - - - 45

Dr. Hunter, - - - - - - - - - - - - - 46
Dr. Thomas, - - - - - - - - - - - - 47
Dr. Bogue, - - - - - - - - - - - - - 48
Dr. Friedrichs, - - - - - - - - - - - - 48, 49
Dr. Spalding, - - - - - - - - - - - - - 48
Education — discussed by
Dr. Spalding, - - - - - - - - - - - - 53, 70
Dr. Bogue, - - - - - - - - - - - - 55, 59
Dr. Stockton, - - - - - - - - - - - - 56
Dr. Shepard, - - - - - - - - - - - - 57, 58, 66
Dr. H. A Smith, - - - - - - - - - - 57, 58, 59
Dr. Crouse, - - - - - - - - - - - - 58, 60
Dr. Cook, - - - - - - - - - - - - - 59
Dr. Werner, - - - - - - - - - - - - - 61
Dr. Atkinson, - - - - - - - - - - - - 62, 63
Dr. Barrett, - - - - - - - - - - - - 63, 64
Dr. Stellwagen, - - - - - - - - - - - - 64
Dr. Hunt, - - - - - - - - - - - - - 68
Dr. Peirce, - - - - - - - - - - - - - 70
Dr. Rehwinkel, - - - - - - - - - - - - 71
Dental Literature — discussed by
Dr. Bödecker, - - - - - - - - - - 85, 86, 87, 88
Dr. Spalding, - - - - - - - - - - - - - 86
Dr. Werner, - - - - - - - - - - - - 87
Dr. Bogue, - - - - - - - - - - - - 87, 88
Dr. Atkinson, - - - - - - - - - - - - 88
Nomenclature and Terminology — discussed by
Dr. Atkinson, - - - - - - - - - - 95, 97, 99, 100
Dr. Spalding, - - - - - - - - - - - - 97
Dr. Barrett, - - - - - - - - - - - - - 98
Dr. Friedrichs, - - - - - - - - - - - - 99, 100
Dr. Werner, - - - - - - - - - - - - - 100
Operative Dentistry — discussed by
Dr. Hunt, - - - - - - - - - - - - 116, 117
Dr. Friedrichs, - - - - - - - - - - - 116, 117
Dr. Atkinson, - - - - - - - - - - - - 116
Dr. Stellwagen, - - - - - - - - - - - 117, 119
Dr. Darby, - - - - - - - - - - - - 118, 119
Physiology — discussed by
Dr. Peirce, - - - - - - - - - - - - - 125
Physiological Observations on Action of Nitrous Oxide — discussed by
Dr. Osmond, - - - - - - - - - - - - - 130
Dr. Peirce, - - - - - - - - - - - - - 131
Dr. Atkinson, - - - - - - - - - - - - - 131
Dr. Werner, - - - - - - - - - - - - - 133
Dr. Barrett, - - - - - - - - - - - - - 134

OFFICERS.

For 1878–9.

President,	H. J. McKellops,	St. Louis.
First Vice-President,	L. D. Shepard,	Boston.
Second Vice-President,	L. D. Carpenter,	Atlanta, Ga.
Recording Secretary,	Geo. H. Cushing,	Chicago.
Corresponding Secretary,	A. O. Rawls,	Lexington, Ky.
Treasurer,	W H. Goddard,	Louisville.

For 1879–80.

President,	L. D. Shepard,	Boston.
First Vice-President,	C. N. Peirce,	Philadelphia.
Second Vice-President,	Geo. L. Field,	Detroit.
Recording Secretary,	Geo. H. Cushing,	Chicago.
Corresponding Secretary,	M. H. Webb,	Lancaster, Pa.
Treasurer,	W. H. Goddard,	Louisville.

Executive Committee.

J. N. Crouse, Chairman. C. S. Stockton, Secretary.

First Division—Committee of Arrangements.

Fillebrown,* Cook and Barrett.*

Second Division—On Credentials and Auditing Committee.

Crouse, Keely and Stockton.

Third Division—On Volunteer Papers.

Peirce, Morgan* and Black.

Local Committee of Arrangements.

Thos. Fillebrown, J. G. W. Werner and C. A. Brackett.

* These go out August, 1880.

MINUTES OF TRANSACTIONS

OF THE

AMERICAN DENTAL ASSOCIATION

SESSION OF 1879

By GEO. H. CUSHING.

FIRST DAY—MORNING SESSION.

THE AMERICAN DENTAL ASSOCIATION commenced its Nineteenth Annual Session at the Pavilion, in Prospect Park, Niagara Falls, Tuesday, August 5, 1879, at 11 A.M.; the President, H. J. McKellops, in the chair.

The session was opened with prayer by Dr. C. S. Stockton.

The roll of qualified members was then called, and the following members answered to their names:

* ALLEN, JOHN	314 Fifth ave., New York.
ATKINSON, W. H.	41 East Ninth st., New York.
* ALLPORT, W. W.	Chicago, Ill.
BOGUE, E. A.	29 East Twentieth st., New York.
* BROPHY, T. W.	126 State st., Chicago.
BIDDLE, C. H.	50 Livingston st., Brooklyn, N. Y.
BECK, C. S.	Wilkesbarre, Penn.
BUTLER, C. R.	Cleveland, Ohio.
BROWN, SENECA B.	Fort Wayne, Ind.
* BRACKETT, C. A.	Newport, R. I.
BARRETT, W. C.	Buffalo, N. Y.
BÖDECKER, C. F. W.	73 West Forty-fifth st., N. Y.
* COLTON, A.	Hudson, N. Y.
CROUSE, J. N.	734 Michigan ave., Chicago.
CUSHING, GEO. H.	34 Monroe st., Chicago.

Those marked thus (*) were absent but sent their dues.

Cowie, Henry	Detroit, Mich.
Cook, C. D.	133 Pacific st., Brooklyn, N. Y.
* Chaim, M. L.	30 Cooper Institute, N. Y.
Cleland, James	Detroit, Mich.
Dean, M. S.	34 Monroe st., Chicago.
Darby, E. T.	1513 Walnut st., Philadelphia.
Daboll, G. C.	Buffalo, N. Y.
Davis, K. B.	Springfield, Ill.
Essig, C. J.	1533 Locust st., Philadelphia.
Emminger, A. F.	Columbus, Ohio.
Field, Geo. L.	Detroit, Mich.
Freeman, S. A.	14 Court st., Buffalo, N. Y.
Friedrichs, Geo. J.	155 St. Charles st., New Orleans.
* Fillebrown, Thos.	Portland, Maine.
* Freeman, A. W.	675 Wabash ave., Chicago.
Flagg, Eben M.	54 Bible House, N. Y.
Finley, M. F.	Ypsilanti, Mich.
Goddard, Wm. H.	Louisville, Ky.
Guilford, S. H.	4006 Chestnut st., Philadelphia.
* Gaylord, E. S.	New Haven, Conn.
Harlan, A. W.	70 Dearborn st., Chicago.
* Huey, Robt.	330 South Fifteenth st., Philadelphia.
Hunt, R. F.	1806 H st., Washington, D. C.
Hoysradt, G. W.	15 North Cayuga st., Ithaca, N. Y.
Hall, J. W.	1337 Washington st., St. Louis.
Harroun, C. H.	Toledo, Ohio.
* How, W. Storer	Cincinnati, Ohio.
Hunter, E.	Jackson, Mich.
* Holmes, A. M.	Morrisville, N. Y.
Hanks, J. C.	Newark, N. J.
* Hooper, J.	Owenton, Ky.
* Ingersoll, L. C.	Keokuk, Iowa.
* Jackson, H. H.	319 Jefferson ave., Detroit, Mich.
Klump, G. W.	Williamsport, Penn.
Keely, Geo. W.	Oxford, Ohio.
Lyman, A. E.	Warren, Ohio.
Levy, Fred A.	Orange, N. J.
* McManus, Jas.	Hartford, Conn.
McKellops, H. J.	1127 Washington ave., St. Louis, Mo.
Merritt, Chas.	25 West Twenty-third st., N. Y.
Morgan, Henry W.	Nashville, Tenn.
McNaughton, D. C.	129 Grand st., Jersey City, N. J.
McDonald, Geo. B.	Conneautsville, Penn.
* Morrison, W. N.	St. Louis, Mo.
Northrup, A. L.	44 West Forty-sixth st., N. Y.
* Noble, H. B.	1111 Penn ave., Washington, D. C.

Odell, F. M.	18 West Eleventh st., N. Y.
Osmond, E.	266 Vine st., Cincinnati, Ohio.
* Palmer, S. B.	39½ Warren st., Syracuse, N. Y.
Peirce, C. N.	1617 Green st., Philadelphia.
Priest, A. N.	Utica, N. Y.
* Page, W. E.	3 Dexter Row, Boston.
Richter, R. G.	Milwaukee, Iowa.
Richards, F. J.	Williamsport, Penn.
* Rhone, J. W.	Bellefonte, Penn.
Rehwinkel, F. H.	Chillicothe, Ohio.
* Swartley, J. S.	785 Michigan ave., Chicago.
Shepard, L. D.	100 Boylston st., Boston.
Stockton, C. S.	Newark, N. J.
Stellwagen, Thos. C.	1627 Chestnut st., Philadelphia.
Spalding, C. W.	1606 Olive st., St. Louis, Mo.
Smith, H. A.	286 Race st., Cincinnati.
Taft, J.	117 West Fourth st., Cincinnati.
Thomas, G. R.	Detroit, Mich.
Taft, Will	93 East Fourth st., Cincinnati, Ohio.
* Waters, G. F.	8 Beacon st., Boston.
Webb, M. H.	Lancaster, Penn.
Werner, J. G. W.	41 Upton st., Boston.
* Wetherbee, I. J.	46 Dover st., Boston.
* Whitaker, Geo. W. H.	Sandersville, Ga.
Watling, J. A.	Ypsilanti, Mich.

The following gentlemen, not being present, sent their dues for 1878: Swain, E. D.; Nichols, Gorton; Smith, Joshua; Kitchen, C. A.

The President then read the annual address.

Upon motion of Dr. Hunt, amended by Dr. Taft, the address of the president was referred to a special committee of three, whom the chair appointed as follows: Drs. J. Taft, R. Finley Hunt and Geo. W. Keely.

On motion, the programme offered by the Executive Committee, with slight amendment, was adopted.

The Executive Committee reported that they had filled vacancies in the board by electing Drs. C. S. Stockton, E. T. Darby and S. H. Guilford.

The Publication Committee submitted the following report:

The Publication Committee respectfully submit the following report:

They have published four hundred copies of the proceedings of the session of 1878, and have transmitted copies of the same to all members entitled to them; also to various libraries, and to the dental journals in this and foreign countries. They have on hand about two hundred copies. They have also had printed one hundred pamphlet copies of the amended constitution.

The following is a statement of their account with the Association.

AMERICAN DENTAL ASSOCIATION, TO THE PUBLICATION COMMITTEE.

Dr.

To publication of 400 copies of Transactions, and 100 copies of Constitution		$340 26
" Printing notices regarding sections		3 00
" Engraving		15 75
" Postage, stationery and expressage		30 65
		$389 66

Cr.

By cash from Treasurer	$240 00	
" " " sale of Transactions	3 00	
		243 00
Balance due the Committee		$146 66

We have examined the above and find it correct, August 5, 1879.

J. N. CROUSE.
GEORGE W. KEELY.
C. S. STOCKTON.

The committee desire to call the attention of the Association to the fact that several of the papers read before it at the last session were published in the journals before the Transactions were issued.

Such publication is clearly in contravention of a universally accepted law governing such matters; which law recognizes all papers read before such bodies as this to be the sole property of the same.

To avoid any misunderstanding for this year, the committee would suggest the adoption of the following resolution:

Resolved, That all papers read before this body shall be considered as the sole property of the Association, and shall not be published elsewhere than in the regular Transactions — previous to the appearance of the latter — except by consent of the Association; and the Publication Committee is instructed to exclude from the Transactions any paper which may be published contrary to this resolution.

They would further recommend the adoption of the following amendment to the constitution, viz: Under the head of "Instructions to the Publication Committee," after the words "still on hand," insert:

Any report or other paper, to be entitled to publication in the volume of

Transactions for the year in which it shall be presented to the Association, must be placed in the hands of the Publication Committee on or before the first day of September, and must also be so prepared that the proof sheets furnished the authors shall be returned to the committee without material alteration or addition.

Every paper received by this Association, and all plates or other means of illustration, shall be considered the exclusive property of the Association, and shall be published for its exclusive benefit.

GEO. H. CUSHING, *Chairman.*
J. N. CROUSE.
GEORGE W. KEELY.

Upon motion of Dr. Atkinson, the report was accepted.

Dr. Atkinson moved that the report be divided, referring the financial portion to the Executive Committee, and retaining the other portion for action by the Association. Carried.

He then moved that that portion now before the Association be laid upon the table. Lost.

Dr. Shepard moved the adoption of the report. After discussion by Drs. Shepard, Atkinson, Spalding, Friedrichs, Stellwagen, Hunt, Peirce, Cook and Cushing, the motion prevailed.

The President presented a letter from Dr. Watt, which upon motion was read by the Secretary.

On motion of Dr. Spalding, the Corresponding Secretary was instructed to make a suitable reply to the same, both of which will be found in the body of the work.

On Dr. Shepard's motion, the letter was further referred to the Publication Committee.

On motion of Dr. H. A. Smith, the Chair appointed the following committee to draft resolutions on the death of Dr. John H. McQuillen: H. A. Smith, W. H. Atkinson and M. S. Dean.

The Treasurer read the following report, which was adopted:

WM. H. GODDARD, TREAS., IN ACCOUNT WITH AM. DENTAL ASSOCIATION.

1878.	*Dr.*	
August 6.	To balance	$158 66
1879.	" cash from Dr. M. S. Dean	1 65
August.	" cash received for dues during the year ...	665 00
		$825 31

Cr.

1878.	By paid Committee of Arrangements	$72 50		
	" " " on Sections	28 25		
	" " Secretary's salary	100 00		
	" " Treasurer's salary	100 00		
	" " Engraving Certificate	91 00		
	" " Committee for Programmes	5 00		
	" " Reporter	150 00		
	" " Pub. Com. Engraving	15 00		
	" " Pub. Com. Transactions	225 00		
	" " Incidental Expenses, etc	7 35		
			$794 10	
	Balance			$31 21

WM. H. GODDARD, *Treas.*

Audited and found correct.

J. N. CROUSE,
GEO. W. KEELY, } *Committee.*
C. S. STOCKTON,

Dr. C. N. Peirce moved that a voluntary subscription be made to liquidate the present indebtedness of the Association. Amended by Dr. Taft to refer the subject to a committee of two and by Dr. Shepard to refer to the Executive Committee. It was referred to the Executive Committee.

On motion of Dr. Crouse, adjourned to meet at 7 : 30 P.M., in order that the sections might have time to act.

FIRST-DAY—EVENING SESSION.

Association convened at 8 o'clock. President McKellops in the chair.

Minutes of morning session read and approved.

Report of first section, reporting progress, was read by Dr. R. Finley Hunt, chairman.

The subject of Artificial Dentistry was then discussed by Drs. Stockton, Atkinson, Essig, Stellwagen, R. Finley Hunt, C. R. Butler, Rehwinkel, McDonald, Crouse, Taft, Klump, Hunter, H. A. Smith and Bogue.

A motion to adjourn was lost. Dr. Friedrichs continued the discussion, after which the Association adjourned to 10 A.M. tomorrow.

SECOND DAY—MORNING SESSION.

The Association was called to order at 10:30 A.M. President McKellops in the chair.

The minutes of the previous session were read and approved.

Dr. McNaughton offered the following resolutions:

Resolved, That a committee, consisting of one member of the Association from each state and from the District of Columbia, be appointed by the President to make (with the assistance of the state societies) a complete directory of the dentists of the United States.

Resolved, That the members of the committee be directed to bring the project before their several state and district societies, that such action may be taken as will rectify the directory each year.

Resolved, That when any state or district society shall present to this Association a list, alphabetically arranged, of dentists within such state or district, then this Association shall, through its Committee on Directory, present to such state or district society all lists of dentists in its possession; and shall continue to exchange the amended lists as long as such shall be continued by the several state and district societies.

A motion to lay on the table, by Dr. Peirce, was lost.

After discussion by Drs. Shepard, Hunt, McNaughton and Odell, the resolutions were adopted.

The Committee on Volunteer Papers reported favorably on two papers on operative dentistry, one by Dr. Stellwagen and one by Dr. Friedrichs.

A bill for a seal was presented, and ordered paid.

On motion of Dr. Dean, the subjects of the first section were passed.

Dr. Taft moved the appointment of a committee of three to secure the sending of proper notices of our proceedings to the various papers in the country. Carried, and the Chair appointed as such committee Drs. Taft, Shepard and Stellwagen.

Upon the call of the second section, a report was read by the chairman, Dr. Crouse. On motion, it was received.

Upon motion of Dr. Hunt, the report was divided: one part to embrace only the resolutions, the other part to embrace the remainder. A motion was made to adopt the report without the resolutions. After discussion by Drs. Spalding, Bogue and Stockton, upon the motion of Dr. Shepard, it was laid upon the table.

Dr. Shepard moved to adopt the resolutions which were divided from the report.

Discussed by Drs. H. A. Smith, Cook, Bogue, Crouse, Werner, Atkinson, Barrett, Stellwagen, Shepard, R. Finley Hunt, Peirce, and Rehwinkel.

Upon motion of Dr. Taft, the resolutions were divided. Each to be acted on separately.

Dr. Taft moved the adoption of the first resolution.

Dr. McNaughton offered the following as a substitute:

Resolved, That hereafter no dental college shall be entitled to representation in this Association that does not require an examination of its matriculants; the grade of which shall equal that required for graduation from the Boston Grammar School.

On motion of Dr. Crouse, the substitute was laid on the table. First resolution was then adopted.

Dr. Shepard then moved the adoption of the second resolution, which prevailed.

The third resolution was, on motion of Dr. Shepard, adopted.

The Executive Committee made a partial report, which, by subsequent reports, was completed, as follows:

American Academy of Dental Science—L. D. Shepard.
Chicago Dental Society—M. S. Dean, J. N. Crouse.
Dental Society of the State of New York—A. N. Priest, G. W. Hoysradt, S. A. Freeman, W. C. Barrett, A. M. Holmes.
Dental Department of Vanderbilt University—Henry W. Morgan.
First District Dental Society of New York—W. H. Atkinson, C. F. W. Bödecker, E. M. Flagg.
Illinois State Dental Society—Geo. H. Cushing, A. W. Harlan, K. B. Davis.
Indiana State Dental Association—Seneca B. Brown.

Kentucky State Dental Society — W. H. Goddard.
Michigan State Dental Society — M. F. Finley.
Michigan Dental Association — Henry Cowie.
Mississippi Valley Association of Dental Surgeons — R. G. Richter, E. Osmond.
New Jersey State Dental Society — C. S. Stockton, D. C. McNaughton, J. C. Hanks, F. W. Levy.
Northern Ohio Dental Association — C. R. Butler.
Odontological Society of Pennsylvania — M. H. Webb, S. H. Guilford.
Odontological Society of the City of New York — A. L. Northrop.
Ohio Dental Society — C. H. Harroun.
Pennsylvania State Dental Society — E. T. Darby, C. J. Essig, G. B. McDonald.
Pennsylvania Association of Dental Surgeons — Robert Huey.
Pennsylvania College of Dental Surgery — C. N. Peirce.
Philadelphia Dental College — Thos. C. Stellwagen.
Washington Dental Society — R. Finley Hunt.

Association then adjourned.

SECOND DAY—EVENING SESSION.

Association convened at 8:15 P.M. President McKellops in the chair.

The minutes of morning session were read and approved.

The following resolutions were offered by Dr. McNaughton:

WHEREAS, The continued financial depression has caused the rank and file of the dental profession throughout the country to greatly reduce their fees for services rendered; and

WHEREAS, A large majority of the standard articles used by the profession remain at about war prices; and

WHEREAS, A large proportion of the improvements and inventions relating to dentistry are the result of suggestions made by the dentists themselves; therefore, be it

Resolved, That we deem it our right to demand of manufacturers of and dealers in dental goods, such reduction in their prices as will more nearly correspond with the depressed financial condition of the times.

On motion of Dr. Harlan, the resolutions were laid on the table.

On motion, the subject of second section was passed, and the third section was called.

Dr. Taft read the report on Literature, which was discussed by Drs. Bödecker, Werner, Bogue and Atkinson,—after which Dr. Atkinson read the report on Nomenclature and Terminology, at the close of which, on motion, the Association adjourned.

THIRD DAY--MORNING SESSION.

Association convened at 10:30 A.M. President McKellops in the chair. Minutes of evening session read and approved.

The Executive Committee made a partial report.

Dr. Dean moved that an extra session be held this afternoon at 4 o'clock, for the selection of next place of meeting and the election of officers. Carried.

A communication was read from Mr. Delano, presenting claim for rent of Grant's Hall, which was referred to the local Committee of Arrangements.

The committee to whom was referred the President's address, presented a report through Dr. Taft, its chairman, which was adopted, as follows:

The special committee to whom was referred the address of the President, respectfully report that many of the suggestions contained therein have already been disposed of by the action of the Association.

One of those not so disposed of referred to the encouragement of inventors and manufacturers exhibiting their productions at our annual meetings. The committee concur in the propriety of this encouragement, but believe that it will be practically effected in a business way by individual members, without action by the Association.

To secure a wider dissemination of our proceedings, as suggested by the President and Secretary, the committee recommend that copies of the printed Transactions be distributed each year by the Secretary to such public libraries and other institutions as may be designated by the Publication Committee.

The most important suggestion before the committee is that relating to the "concentration of the entire strength of the profession in our truly national body."

A committee was appointed last year with the understanding (not expressed in the resolution creating it) that it would consider this subject and report on it at this meeting. It is hoped that that committee will make

such suggestions as will lead to this most desirable union and concentration. Otherwise it is now recommended that the Association take steps looking definitely to that end.

J. TAFT.
R. FINLEY HUNT.
GEORGE W. KEELY.

On motion of Dr. Crouse, all bills properly authenticated were ordered to be paid.

The regular order of business was then resumed, and the discussion on Dr. Atkinson's report was participated in by Drs. Atkinson, Spalding, Barrett, Friedrichs and Werner. On motion of Dr. Klump, the subject was passed.

On motion, the rules were suspended and a verbal report of the Executive Committee relative to the demand for rent of Grant's Hall was received.

Dr. Taft moved that the Recording Secretary be instructed to make a proper reply. This was amended, to refer the subject back to the committee, and the Secretary instructed to notify the parties of this fact.

The Committee on Resolutions, on the death of Dr. McQuillen, presented their report, which was received. Touching and eloquent remarks were made by Drs. Rehwinkel, Barrett, Stellwagen, Spalding, Beck and Atkinson, and the report was unanimously adopted by a rising vote. See memorial page.

The President announced the following Committee on Directory:

COMMITTEE ON DIRECTORY.

D. C. McNaughton, Jersey City, N. J., *Chairman.*

Maine.....Thos. Fillebrown.	Maryland .....F. J. S. Gorgas.
New Hampshire, Vermont ..... W. E. Page., Massachusetts .	D. of C.... ...R. F. Hunt.
	Virginia .....J. H. Moore.
	W. Virginia ...D. B. McLane.
Rhode Island..C. A. Brackett.	N. Carolina ...E. Floyd.
Connecticut ...J. McManus.	S. Carolina ....Thos. T. Moore.
New York ....S. A. Freeman.	Florida .....R. F. Phillips.
Delaware.....J. E. Register.	Georgia .....G. W. H. Whitaker.
Pennsylvania ..G. W. Klump.	Alabama .....E. S. Chisholm.

Mississippi ....J. D. Miles.
Louisiana. ....G. J. Friedrichs.
Texas .....J. A. Tulloss.
Arkansas . ...E. Collins.
Kansas .....A. H. Thompson.
Tennessee .....H. W. Morgan.
Kentucky .....A. O. Rawls.
Ohio .....A. F. Emminger.
Indiana .....S. B. Brown.
Illinois .... ..A. W. Harlan.
Michigan .....Geo. L. Field.
Wisconsin.....Arthur Holbrook.
Minnesota ....D. C. Price.
Iowa .....L. C. Ingersoll.
Nebraska.....T. C. Kern.
Colorado .....J. C. Fuller.
Nevada .....W. O. Conwell.
California .....Wm. Dutch.
Oregon .....S. J. Barber.
Territories at Large ..... } E. T. Darby.
Missouri .....J. G. Harper.

Section 4 was called and a report written by Dr. Wetherbee was read by Dr. Daboll, and one by Dr. McDonald read by himself. A volunteer paper was then read by Dr. Stellwagen, followed by one by Dr. Friedrichs, all discussed by Drs. R. Finley Hunt, Darby and Osmond up to the hour for adjournment. Upon motion of Dr. Taft, the time was extended, to enable the Secretary to get the names of members of sections. After which adjourned, to meet at 4 P.M.

THIRD DAY—AFTERNOON SESSION.

Association convened at 4:30. President McKellops in the chair.

Minutes of morning session were read, corrected and approved.

Dr. Harlan moved that a committee of three be appointed, in accordance with the recommendation of the special committee to whom was referred the President's address, to devise means to secure the concentration of the entire strength of the profession in one truly national body. Carried.

The Chair appointed as that committee, Drs. Harlan, Rehwinkel and Peirce.

On motion of Dr. Dean, the President — Dr. McKellops — was added to the committee.

Dr. Atkinson offered a resolution, which was recommitted for amendment of phraseology.

Dr. Stellwagen offered the following resolution: That all applause by stamping or clapping of hands during the session of this Association be considered out of order.

On motion, the resolution was laid on the table.

The selection of the place of meeting for the next session being now in order, the President appointed Drs. H. Morgan and A. W. Harlan, tellers. Boston, New York, Niagara Falls and Long Branch were nominated, and Boston was selected on the first ballot.

On motion, it was voted that members remain in their seats and vote open ballots, in order to save trouble to the tellers.

The election of officers was then proceeded with, resulting as follows:

President — L. D. SHEPARD.
First Vice President — C. N. PEIRCE.
Second Vice-President — GEORGE L. FIELD.
Corresponding Secretary — M. H. WEBB.
Recording Secretary — GEORGE H. CUSHING.
Treasurer — W. H. GODDARD.
Executive Committee — J. N. CROUSE, C. S. STOCKTON, C. D. COOK; and to fill unexpired term of Dr. JUDD, W. C. BARRETT.

Association then adjourned to meet at 8:30 this evening.

THIRD DAY—EVENING SESSION.

Association convened at 8:30. President McKellops in the chair.

Miscellaneous business being in order, Dr. Atkinson moved that the Recording Secretary be instructed to open communication with all members of the Association in good standing, to ascertain upon which section they will elect to work, and to embody in his communication that unless a reply is received within twenty days from the time of writing, they will be assigned sections by the Secretary according to his option. Carried.

On motion of Dr. Spalding, it was voted that the sections meet for organization to-morrow morning at 9 o'clock, at this place.

On motion of Dr. Shepard, it was resolved that the several sections shall meet for the purpose of perfecting their reports as soon

after the organization of the Association — on the first day — as possible.

Dr. Hunt offered the following, which was lost:

Resolved, That the members of each section be required to place in the hands of the chairman of his section the result of any labors that may have been assigned to him, thirty days before the meeting of the Association.

On motion of Dr. Spalding, the following was adopted:

Resolved, That the reports of sections shall be called by the President in consecutive order, beginning each succeeding year one number higher than on the preceding year. Thus in 1879 the calling of sections began with No. 1. In 1880 it shall begin with No. 2 and end with No. 1, and so on.

Dr. Crouse, of the Executive Committee, made a statement of the financial condition of the Association, and suggested the taking of a voluntary contribution, which was done.

On motion, the Treasurer was instructed to notify absent members of this action and of the needs of the Association, and to solicit their aid.

The regular order was resumed, being the section on Operative Dentistry, and, on motion, this was passed.

Section 5 being called, Dr. Dean read a brief report on Physiology, and Dr. Werner made a verbal report on some physiological observations on the Action of Nitrous Oxide as an anesthetic. Discussed by Drs. Osmond, Peirce, Atkinson, Werner and Spalding.

Adjourned to meet at 10 o'clock A.M. to-morrow.

FOURTH DAY — MORNING SESSION.

The Association was called to order at 10:30 A.M. President McKellops in the chair.

The minutes of previous session were read and approved.

Upon motion, the newly elected officers were installed. Dr. McKellops made a few very happy remarks upon introducing the newly elected President, Dr. Shepard, which were as happily responded to by him.

Section 6 being called, and no report ready, it was, on motion, passed.

The following, offered by Dr. Stockton, were passed:

Resolved, That our thanks are tendered to our retiring officers for the efficient and courteous manner in which they have discharged their duties; also to our local committee, for the admirable manner in which they have performed the labor intrusted to them; also to the hotel proprietors, to railroad officials, for courtesies extended; to those who so generously came to our help by their volunteer contributions, and to the reporters of the press, for the excellent reports they have made.

The following, being the resolutions presented by Dr. Atkinson, and recommitted, were then adopted:

WHEREAS, This Association realizes the injury that is being done in foreign countries, by the *sale* of Medical and Dental Diplomas by one or two disreputable parties in America, to persons not entitled to receive the degree which these documents pretend to confer; and

WHEREAS, We are informed that in a recent pamphlet (1877), "A Book Reviewer," of Berlin, has endeavored to place the "Livingston University of America" (and some other institutions which, if they have any real existence, are equally unknown in this country) on a par with reputable Dental Colleges in Philadelphia; therefore, be it

Resolved, That we deplore the injury that has been done to the general profession abroad, and which this pamphlet may tend to increase; and that we will do all in our power to suppress the illegitimate traffic in Dental Diplomas, which degrades alike the profession in our own and in foreign lands.

Resolved, That we sympathize with any individuals who may have been aggrieved by the false statements, and with those reputable Dental Schools which have been misrepresented and defamed in the above-named pamphlet.

The following notice of amendments to the constitution was made by Dr. Spalding:

To amend third division of Section 6 of Article V by striking out the words "Nominations and." Also to amend the next paragraph of the same section so that it shall read as follows: The President shall appoint two members of this Association who shall act in conjunction with the Recording Secretary as the Publication Committee.

The chair appointed on Publication Committee, J. N. Crouse and Geo. W. Keely, and as local Committee of Arrangements Thos. Fillebrown, J. G. W. Werner and C. A. Brackett. The sections were reorganized as follows:

SECTION I. Artificial Dentistry, Metallurgy and Chemistry.—C. S. Stockton, Chairman; R. Finley Hunt, Eben M. Flagg, Henry Cowie, A. N. Priest, James Cleland, S. A. Freeman, M. L. Chaim, John Allen, Edgar Palmer, C. P. Pruyne, H. H. Keith, Chas. Welsh, J. F. Canine, J. W. Hall,

C. H. Harroun, H. W. Storer, A. E. Lyman, J. S. Cassidy, E. Honsinger, W. E. Hoag, D. C. Kelly, D. D. Smith, Merritt Wells, S. M. Cummins, J. Lathrop.

SECTION 2. Dental Education.—J. N. Crouse, Chairman; C. W. Spalding, C. N. Peirce, L. D. Shepard, C. J. Essig, T. C. Stellwagen, G. J. Friedrichs, H. A. Smith, K. B. Davis, Thos. Fillebrown, L. C. Ingersoll, C. D. Cook, D. C. McNaughton, W. H. Eames, A. M. Holmes, Chas. Merritt, H. B. Noble, H. L. Ambler, J. G. Templeton, E. S. Holmes, J. G. Harper, C. A. Kitchen, J. G. McMillen, Chas. Miller, E. Noyes, W. M. Reynolds, J. H. Smith, A. W. Smith, C. R. E. Koch, W. E. Magill, R. S. Rathbun.

SECTION 3. Dental Literature and Nomenclature.—W. H. Atkinson, Chairman; J. Taft, A. L. Northrop, F. A. Levy, J. N. Farrar, J. A. Stipp, H. L. Sage, C. A. Kingsbury, Wm. Jarvie, Jr., S. B. Brown, A. Colton, C. C. Chittenden, J. Hooper, J. G. Ambler, W. A. Bronson, D. W. Claney, Isaiah Forbes, J. S. Hill, F. A. Hunter, W. E. Riggs, J. C. Whinery, C. F. Wheeler.

SECTION 4. Operative Dentistry.—Geo. W. Keely, Chairman; H. J. McKellops, E. T. Darby, R. G. Richter, H. W. Morgan, G. W. Hoysradt, G. B. McDonald, J. C. Hanks, E. Osmond, W. H. Goddard, I. J. Wetherbee, W. C. Dyer, J. W. Rhone, A. H. Brockway, Jas. McManus, G. R. Thomas, L. G. Noel, W. H. Morgan, T. S. Hacker, C. J. Keely, John M. Hurtt, G. C. Daboll, C. R. Butler, George L. Field, S. H. Guilford, F. J. Richards, J. S. Swartley, G. W. Carman, L. D. Carpenter, Wm. Dutch, C. E. Frances, J. L. Clapp.

SECTION 5. Anatomy, Physiology, Histology, Microscopy and Etiology. —Geo. H. Cushing, Chairman; M. S. Dean, W. E. Page, J. G. W. Werner, M. H. Webb, Geo. F. Waters, Frank Abbott, W. H. Allen, C. F. W. Bödecker, G. V. Black, J. F. Marriner, W. C. Barrett, A. F. Emminger, Joshua Smith, E. S. Gaylord, W. W. Allport, S. W. Dennis, D. C. Hawxhurst, Wm. Taft, E. Hunter, E. D. Swain.

SECTION 6. Pathology, Therapeutics and Materia Medica.—F. M. Odell, Chairman; A. W. Harlan, C. S. Beck, M. F. Finley, G. W. Klump, C. A. Brackett, W. O. Kulp, E. A. Bogue, A. O. Rawls, W. N. Morrison, I. P. Wilson, C. H. Biddle, A. W. Freeman, H. H. Jackson, S. B. Palmer, F. H. Rehwinkel, C. E. Dunn, Oscar B. Doyle, I. Douglass, W. S. Moores, Gorton Nichols, Stoddard Driggs, T. W. Brophy.

Dr. Beck gave following notice of amendments to Constitution:

To amend Sec. 2 of Art. III of the Constitution by adding the words "or suspended," after the word "expelled," making the article read: Any member of this Association, being expelled or suspended from his local society, shall from that date cease to be a member of this body.

The minutes of the present session were then read and approved, and the Association adjourned to meet at Boston, on the first Tuesday in August, 1880.

In Memoriam.

JOHN H. McQUILLEN.

Your committee appointed to draft resolutions on the death of Dr. McQuillen beg leave to offer the following sentiment, which they believe will accord with the feelings of each member of this Association.

The Father of this Association has been called from labor to rest. Although we cannot see him by the use of our outward eyes, as present among us, beholding our good behavior, rejoicing in our progress, nevertheless, he doubtless is still with us in spirit and purpose, to assist in accomplishing the completion of the work so wisely begun by him while yet in the flesh among us. We mourn for ourselves in being deprived of his wise counsels and coöperation ; but we rejoice for him in that he is no longer amenable to the sorrows of misunderstandings and mental differences. May we all emulate his example of untiring effort for the upbuilding of our knowledge and efficiency in the great work for which this body was instituted! Though out of sight, still we feel him near to us all in harmonious fellowship in our work.

Dr. Rehwinkel: I simply want to say that the kindly feeling and high appreciation of the members of the committee are shown in the phraseology of the sentiment presented. Their tribute is eloquent and beautiful, and I do not know that anything can be added to it; however, I want to say a few words. Any one who has known our departed colleague will know what a loss the dental profession has sustained. Those who had the honor to be called friends by him, will feel their bereavement to such an extent that language fails to express it. There was one touching allusion, in which it is said that our loss is his gain, that he is now relieved from all misunderstandings, all troubles and strife of life. I do not think, Mr. President, that there are many in the profession like Dr. McQuillen. There are few his equals, and still fewer his superiors; and I think we cannot express our sense of appre-

ciation of his merits, of his good, manly and generous qualities, in too strong and eloquent terms.

Dr. Barrett: It is when we come together in these meetings, and our minds begin to commingle, that we most keenly feel our loss. In the discussions of this morning it has come home to every one of us. There are times when certain special subjects are brought up for consideration, and we look around and unconsciously listen for the voice which we have so long been accustomed to hear, and we see — what?—a vacant seat; and then there comes to our hearts that indescribable yearning,— that passionate longing:

> "O, for the touch of a vanished hand,
> And the sound of a voice that is still."

Dr. Spalding: It is always sad to contemplate the death of a friend, and it is doubly so when we are brought face to face with the fact that our friend is dead. Dr. McQuillen was *one* of the founders, if not *the* founder, of this Association, and I believe I detract nothing from the just merits of any other member, living or dead, when I say that no one has labored more earnestly than he in bringing this Association to its present condition of usefulness. Now that he is absent, we can all the more readily estimate the value of his presence. Now that he will meet with us no more, we can the more fully appreciate the work that he has done. That we shall miss the courteous gentleman, whose face was ever robed in cheerfulness, I need not say. His place is henceforth vacant; we shall see him here no more. Yet we do not contemplate him as dead; we look upon him as still living. He has only trodden in advance the path that we, too, must soon follow. He has launched his bark upon that "mysterious sea whose waves have never borne the image" of a returning sail. He has "gone to the undiscovered country from whose bourne no traveler returns." But though he can never again be present in the body, may he not be near us in spirit? May not his strong love for this Association cause him to draw near to us at this time? Indeed, I almost feel as if the words to which I am now giving utterance, were suggested by his friendly presence! I almost feel, that when I take my seat, he will rise and say, "my friend from St. Louis is quite too partial in his praise; I have only done my duty." Let us then cherish the memory of his virtues, and embalm in our hearts the thought

that he is still one of us; that the separation that has taken place is only for a brief interval; that ere long we shall meet again.

Dr. Stellwagen: Intimately associated as I was with Dr. McQuillen, from almost my very commencement in the study of dentistry, I suppose it would be my place here, under ordinary circumstances, and where only ordinary attachments had been formed, to speak. I took occasion, however, during his life, to show, as far as I was able, my appreciation of his work. I took occasion, during his life, to be worthy,—as far as I was able,— of his friendship, and I had it. Now that he has passed from our physical perception, it is not necessary to say anything more. I loved and I still love him. I ever shall delight in the remembrance of his regard and love for me. Dr. McQuillen lived for nothing but his profession and his family,— the most devoted, earnest, honest workman that we ever had in this profession. In the dental associations, in his college, in all of his various functions in connection with the profession, I do not think any one has ever excelled him.

My feelings will not permit me to bemoan in public a loss so great,—a loss to me so painful and so irreparable. My grief is too profound and poignant to vent itself in the conventionalities of words My heart's emotions paralyze my tongue's attempts at utterance. I am dumb over the grave of this idol of my professional soul.

Dr. Beck: I cannot allow myself to sit still and hear so much good spoken of my dear friend Dr. McQuillen without saying something, for I claim that I knew him better and longer than any gentleman in this room. Dr. McQuillen and I were students together. We came together hand to hand in the office of Dr. J. D. White, of Philadelphia. I loved him,—he was a noble-hearted man; his hand was always extended, his house was always open, and his friends ever welcome. Dr. McQuillen never felt better satisfied than when his friends were around him. I always found him a gentleman of honor whose word you could depend upon. He has done much for the dental profession. I assure you I appreciate all that has been said by the gentlemen who have preceded me. I think this society cannot do too much honor to our deceased brother's memory.

Dr. Atkinson: Our affections are touched by the passage of our friends out of sight. I do not regard Dr. McQuillen as dead

in thought, nor in his work and purpose of life; I think he is here, and that thought is not a degrading one to me. I loved him dearly, I loved his ambition, and as we all have differences with our dearest friends, so I had differences with him. We could not be individuals and have no differences; we could not have anything worth living for if we were all molded into one individual, continuous in personality. In reflecting upon this change that we have had presented to us as a dreadful thing, I shall but give a little different direction to our reflections, as they were foreshadowed in the few words in the resolution presented to this body, in saying that "he is not dead but sleepeth"; and that he will coincide with us in spirit, in purpose and efficiency, just so far as we utilize the light that he threw upon our pathway. May we all be as earnest and as persistent in discharging the duties that lie upon our consciences as he was, is the prayer of my heart for us all.

PRESIDENT'S ADDRESS.

H. J. McKELLOPS.

GENTLEMEN OF THE AMERICAN DENTAL ASSOCIATION: We are now assembled for the purpose of holding the nineteenth annual meeting of this Association; we come together at these stated gatherings with the intent of laying upon the common altar of the profession the results of our labors for the year that is past.

In opening in a somewhat formal manner the proceedings of this meeting, I have ventured to deviate in some degree from the usual custom by laying before you a few suggestions that appear to me to deserve your earnest consideration.

Soon after the close of the last meeting several of the papers read at that time appeared in the medical and dental journals in advance of the publication of the annual volume of transactions. Heretofore all papers read before this body have been regarded as the exclusive property of the Association; yet, in the absence of any rule of the Association governing the subject, no restriction has been placed upon the authors of such papers to prevent the use of duplicate copies. It seems desirable that the Association should adopt some rule controlling the disposition of all papers read at its meetings in the future, else the transactions will lose much of their present value. A wider distribution of these volumes seems also desirable, and a suggestion of the Recording Secretary that copies be furnished to public libraries meets with my hearty approval.

There are now in existence three general bodies composed of members of our profession, each claiming national characteristics. The oldest is the American Dental Convention. This body, the American Dental Association, ranks next in point of age, and the youngest of the three is the National (late Southern) Dental Association. This division of our forces into three parts has a tendency to diminish the benefits which would result from a concentration of the entire strength of the profession in one truly national body. This subject seems worthy of your particular consideration at this time.

Larger provision has been made this year for the display of instruments, materials and appliances than has been heretofore provided. Encouragement should be given to this branch, as it comprises its chief exhibition, and inducements should be held out to manufacturers and inventors to bring their products to our meetings, that a knowledge of all improvements may be generally disseminated. The dental periodical and the secular press would probably aid in this work.

I would also suggest that some systematic effort be made to provide reports of our proceedings for the daily papers in all the large cities of the country. A knowledge of the existence of this organization and of the works in which it is engaged, would thus be brought into popular notice. In conclusion, gentlemen, it becomes my painful duty to speak of the decease, since our last meeting, of one of the original members of this Association, one who has ever manifested a deep interest in its proceedings and who has largely contributed to its success. I allude to Dr. John H. McQuillen, whose death attracted the attention of the dental profession both in this country and in Europe. It is not my purpose to attempt any eulogy of that distinguished gentleman, but only in my official capacity to call attention to the loss which this society and the profession at large have sustained in his death.

LETTER FROM DR. GEORGE WATT.

To the President of the American Dental Association:

DEAR SIR,— Allow me to address you, and through you my brethren of the American Dental Association. Will you kindly allow the address to be personal as well as peculiar. I am laid on the shelf, and the front of the shelf is being turned upward, turning me to the wall and shutting me from your sight, and, worse still, shutting you from mine. I thought I was reconciled to the position, and said so; but all these years I have indulged the fond hope that once more I would be able to meet with our beloved Association and take a farewell look at your familiar faces, and the fresh blasting of this hope has told me how much mistaken, how unreconciled, I am. Hence this wail; for though the judgment is able to say: "Even so, Father, thy will be done," the heart shrieks at every blow. I would not have you think of me as morose or melancholy. With cheerful countenance I am struggling for — *breath* as diligently as ever I labored for the advancement of professional knowledge, and am sorry that my success in this is but little if any better than in that. Of course, if with you now, I would see many strange faces, and even those familiar ones changed by the touch of time. The younger members, some of them pupils of my pupils,— perhaps a large majority of members present — have not even heard my name, though to me it seems but yesterday that I was an active, honored, or at any rate petted member of the Association. "Backward! turn backward, O Time, thy flight." But no! onward and upward must be my watchwords, as they express the hopes and aims of our beloved Association. I say *our*, for though on the shelf, I feel that I am still one with you, and I hold a delegate's certificate, which of course I cannot use, as this is written from a sick bed.

A word for the past: When I came from the medical to the dental profession, I was received with open arms. Opportunities for usefulness unsought presented themselves. Positions of responsibility and trust were freely offered, indeed I may truly say

thrust themselves on me. Acceptance of these involved sacrifices, both vital and financial. How faithful to these trusts I proved only your older members can judge. Much that I said should have been left unsaid. The same is true to a less extent, perhaps, of what I have written. It is a pleasure now to remember that all was written with the kindliest feeling, except a single short and unimportant paragraph. Some of my written articles received more attention than they merited. One or two, I think, received less. The Thoughts on Caries (see "Chemical Essays," or Appendix to Taft's Operative Dentistry) resulted from long, severe study, laborious research, prolonged and expensive experiments in and out of the mouth, and the conclusions were not hastily drawn, and I confidently believe will stand the test of time; and yet, I am sorry to say, very many of you in speaking of dental caries confound predisposing with the immediate causes as though the articles had never been written. I regard these articles, in reference to caries, as capable of being more useful than any others I have written, but their practical application requires some thought on the part of the reader, leading out in the direction of dietetics and general hygiene.

The article on Topical Remedies, read at Hope Chapel, New York, in 1856, was the most carefully written of all my essays. Two weeks' investigation and experiment were sometimes necessary before a sentence begun could be finished, and the reception awarded it should assure young writers that carefully matured thought will be duly appreciated. It was published in the "Dental Register" and copied by all the dental journals in the world.

Many years ago I began a series of researches, observations and experiments in reference to the deposition of tartar or salivary calculus. These have been continued, as health would permit, to the present time. They are by far the most important and the most satisfactory researches I have ever made. I have not been able to set them before the profession in writing, but have endeavored, at some of the meetings of the Ohio State Dental Society, to give a verbal account of them. But in the hurry of debate, important ideas often fail to be caught by the hearers, and some of you know that even "verbatim reporters" fail to take me. Hence I feel that my views on the subject are not before the profession, though I hope I may be spared to yet write them out. Indeed,

it was my earnest hope to be able to give them to this meeting of our association, as I was earnestly requested to do by my friend Dr. F. H. Rehwinkel, of the department of pathology. But since February I have been too much prostrated, this gossip being no evidence of ability for close thought. But should I be able, hereafter, to give both the general and special pathology present in the condition spoken of, and to suggest treatment, both preventive and curative, at the same time arresting the tendency to white decay, let no one look for a nostrum or a recipe, or anything that will obviate the necessity for brains on the part of the practitioner, as a substitute for the human brain is not yet developed. But this must close; only a page was intended, but the pencil wouldn't stop. It seemed to forget what a feeble hand was behind it. One page would not have exposed so much weakness, nor so much egotism. But why not egotism? I write this. I would like to see you all. I pine for your society, and your individual friendly grasps. I wish you and the Association long life and prosperity. I am distressed that I can't be with you, and therefore I write. I am sorry, and want to say so. *Egotism?*—of course!

And now, Mr. President, I do not intend this for any part of the proceedings of the Association, but when you read it you may tell the brethren about it, or let them read it, or any way to establish or continue a bond of sympathy between them and me. As I am unable to keep up a private correspondence with my brethren, I am become very lonely.

With best wishes for you all, I am, as ever, your friend,

GEO. WATT.

Xenia, Ohio, July 28, 1879.

REPLY.

LANCASTER, PA., August 21, 1879.

PROF. GEO. WATT:

Dear Doctor,—Your letter to Dr. H. J. McKellops, President of the American Dental Association, was read before that body by the Recording Secretary, Dr. G. H. Cushing, and a resolution was passed instructing the Corresponding Secretary to reply to your communication.

I, as Corresponding Secretary, would therefore state that your very kind letter was attentively listened to, awakened the most kindly feelings, and all deeply regretted your absence.

All were very sorry to learn of your illness, but entertained the hope that so valuable a life as yours may be spared for years to come. We are all fully conscious of how you have labored for professional advancement, and I assure you that your presence and counsel is missed at the meetings of the American Dental Association. If all those who now attend the meetings of this Association do not know you personally, surely they must have heard of, even if they have not read, "Watt's Chemical Essays," and other writings — essays of so high a value. May you be spared to yet write out your researches, observations, and experiments, in reference to the deposition of tartar or salivary calculus, is also (I feel assured) the prayer of not only every member of the American Dental Association, but of all those interested in science. They would further pray that you be spared much longer than that. I assure you that there is a bond of sympathy between the members of the American Dental Association and yourself; they certainly feel like turning down the shelf upon which (as you inform us) you are laid, and doing all in their power to raise you with a strong arm upon the five points of fellowship; to call you "from labor to refreshment,"— from sickness to health.

As every member of the American Dental Association would say, so will I write, Very truly your friend,

MARSHALL H. WEBB,
Cor. Sec'y American Dental Association.

REPORT OF SECTION ONE

ON

ARTIFICIAL DENTISTRY, CHEMISTRY AND METALLURGY.

By R. FINLEY HUNT, Chairman.

SECTION ONE, having charge of "Artificial Dentistry, Chemistry and Metallurgy," respectfully report that circumstances beyond the control of its members have prevented their doing more at this time than simply to report progress.

In view of the number of subjects committed to it, — the importance of each one of which might well entitle it to the undivided attention of an entire Section, — of the small number composing this Section, of the short available time since the last meeting and of the preoccupation of the chairman in a work that has been the absorbing duty of his life for three years last past, — it has been impossible for the Section to make to this meeting a report, entering into the discussion of these subjects, that would at all do justice to the subjects, the Association or the Section.

DISCUSSIONS.

Dr. Taft: I hope something will be said upon this subject. The criticism has been made here that the subject of Mechanical Dentistry is usually passed by, no opportunity being afforded to those who are more especially interested in this branch to consider it. The opportunity is now afforded to all such, and I hope they will improve it.

Dr. Stockton: I do not know that there has been anything new brought out during the year in regard to Mechanical Den-

tistry. The same materials are used; the same manner of constructing artificial dentures is still carried on.

I think there is nothing so good for partial plates as gold. For whole plates for the lower jaw continuous gum is the best, while gold for upper sets, fastened with rubber or celluloid, is very desirable. I mention this last because you can thus have a cleaner denture than you can where the teeth are soldered on; although the strongest and best possible work that can be made, in my judgment, is a good gold plate with single teeth soldered on. You can pack rubber in the interstices, and make it clean in that way. When rubber is done away with dentists will be better qualified to practice dentistry as it was practiced years ago. The proper instructions to students are not now given by preceptors, and I think not in colleges, judging from the fact that I see no sets of teeth that are ground up and fitted to the plate as they should be. My practice generally is to take the impression immediately after extraction, and put in a set on celluloid, allowing them to be worn as long as they can be comfortably, and then, if necessary, before the alveolus is absorbed sufficiently for the permanent set, to make them over again. When the time comes I tell my patients that it will be cheaper for them, in health, in comfort and in the pocket, to have a good set of teeth made on gold than on anything else.

I do not want dentistry divided; I want it to remain in its entirety. I do not want, as Dr. Marvin calls it, "fractional dentists." I want the young men who come into dentistry to know the thing from beginning to end. I want them to know how to take the gold or silver coin and from that to make the plate. I want them to know how to make teeth as well. Only a short time since I had a very difficult case indeed, and there was only one gentleman that I could find who could carve me a block for it. I could have done it myself, but two years ago my old furnace gave out, and I did not care to get a new one specially for that purpose. But I claim that every dentist should know how to construct a piece of artificial work from the earliest step to the last.

Dr. Atkinson: My efforts in endeavoring to get this Association organized into permanent sections were for the express purpose of dividing the labor of the body, allowing members to elect in what sections they would work so that the sections might elaborate reports that should be a guide to all who needed a

guide in the direction in which the section had charge. I did not hope that we would start off in the new order with the same celerity and vim that we had pursued in the old method.

I wish now to say a few words respecting the necessity of artificial teeth, and make reference to a few great regrets for the lack of knowledge on the part of those who extract teeth in this country. Anæsthetics of all kinds, nitrous oxide par excellence, are Satan's right hand men, and the agents that use them are the lieutenants that go forward to the reckless work that pains every man of any conscience that belongs to the profession.

Mechanical Dentistry was started upon false principles, upon lack of knowledge of the anatomy of the human jaws and teeth, and an entire misconception of the use of the roots of the teeth. No anatomist will extract healthy roots of teeth, whether they have crowns on them or not. The teeth were put there for the purpose of distributing masticatory force, that food might be properly prepared for the processes of digestion. Who has stood forth and preached that doctrine? Who has practiced that in his life? One half of one per cent of those practicing dentistry would embrace all that have practiced correctly in that direction. We have establishments in the city of New York based upon the idea of cheap artificial teeth being of more value than sound natural teeth, and I have patients under surgical treatment now, where the money had been taken, nitrous oxide administered, teeth crushed off and the roots left in, and the patients came to me to extract the roots. In the last case I refused to extract the roots on the ground that I have already hinted. We must take a new departure or we shall not be a scientific body of practitioners of the art of dentistry, and we must know the basis upon which the art is built. That is the reason why I commended Dr. Dean's remarks respecting the rights of the Sections, according to the organic law that originated them. The Sections are to be the judges when they have anything fit to be presented to this body, and they do not need to ask the vote of this body for further time or anything of the sort. They are independent in that respect, and if they have nothing but a report of progress to make, all they have to do is to make it and we have to accept it, and we are glad to accept it, if in their judgment they have nothing fit to give,—why shall we spend our time at it? Maybe you think it is not worth your while

to listen to these remarks, but I tell you if you are fit to practice dentistry you will see the relevancy of what I have said, and you will see the imperative necessity of our crying out against this ruthless wickedness, this savagery, this abominable butchery that is going on throughout the land. I will instance the case of a young lady who is making her living by her needle, without mentioning any names; but if it becomes necessary I can give names, and if I am confronted, and it denied, I will do so and prove what I say. Calling upon an administrator of nitrous oxide gas to have a single tooth extracted, there were fifteen extracted, the majority of which were sound, and she paid sixteen dollars for the extracting of those teeth; and afterward called upon a friend of mine to have the teeth inserted upon some artificial base. The gentleman, who is a christian and an A-number-one dentist, gave her the work at cost, and she is now in a mutilated condition on account of the ignorance and wickedness, or the ignorance or wickedness, of the person administering the gas and extracting the teeth. The lady who employed the girl, and the girl herself, said they did not want the teeth extracted, and after she came to, remonstrated against the ruthlessness of the removal of excellent teeth in her mouth; and was assured that the best thing that dentistry could do for her was to take her teeth out, though they were sound, and give her a good artificial set of teeth that would not ache. That is what Cheap John dentistry is doing all over the country, and who that has a soul, who that has an intellect, who that has a friend on earth or in heaven, would not pray that some arm might stay such wickedness. But Oh, the dear people, the dear people will have it so! The old book says, "My people love to have it so." They do not love to have it so, but their ignorance has uneducated them so that they do not see anything but what the Cheap John sees, the way to get an unclean dollar on his part, and the way to get an unclean piece of work for a very few dollars on their part; and thus they are going through life crippled and mutilated and unfit to be representatives of the human family and progenitors of a race. If we succeed in accomplishing the work that has been laid out in organizing this body into permanent sections, we shall establish such scientific information as shall let all the people know that a natural tooth is worth more than all the artificial teeth that were ever made; and that we need

whole systems to perform the functions of the body that they may be acceptable, that we may live and enjoy life and be the means of blessing each other in all our intercourse in life. That is what I think about artificial dentistry.

One word or two respecting something that is in preparation. There is some experimenting going on with the hope of casting gold plates so as to be perfectly air and moisture tight to the teeth for artificial dentures, something after the manner of the well known cheoplasty of A. A. Blandy of years gone by. My own impression is that they will, for partial purposes, succeed very well, and I do not know but for entire sets; but I am not so anxious to teach people how to redeem their fellow-men from mischiefs already incurred as to teach them how to avoid the necessity of redemption, to live according to the laws of hygiene, of morality, of fraternity, kindly and honestly, that we may do good by rule, and mischief only by chance and by exception, rather than going on as it is now in artificial dentistry, doing mischief by rule and doing good by chance.

Dr. Essig: I agree with Dr. Stockton that every dentist should be a full dentist, and understand thoroughly every branch of his profession, and I also agree with Dr. Atkinson that there are too many teeth extracted, and that mechanical dentistry is very greatly abused. I appreciate the importance of this matter in this connection because in my experience with students it is not an uncommon thing to have a man present himself and tell you in the very beginning, after asking advice as to the course to pursue in his studies, that he desires to devote his attention exclusively to filling teeth with gold. On one occasion when this happened, I was told by the gentleman that he did not wish to devote any time to laboratory work, he did not want to make its acquaintance; and after he got through I asked him what he meant to do with those cases in which teeth were lost from other causes than that of decay, as from absorption or caries of the alveolus, and he seemed quite puzzled. There is one matter to be looked squarely in the face, and it is that there are other causes for the loss of the teeth less amenable to treatment than caries. The natural organs will be lost, and artificial substitutes must be introduced in their places, and those substitutes must be made accurately and carefully to be useful and serve the purposes of

the natural organs; and, therefore, artificial dentistry cannot be ignored, and ought not to be passed by, as it seems to me in danger of being this evening.

With regard to roots remaining in the mouth, I will simply say that it can be done in many cases. It would be very desirable if some firm foundation could be formed, but we must bear in mind that the artificial denture in many cases is retained in its place by atmospheric adhesion. To secure this there must be some elasticity, and if the substance on which the plate rests is not elastic, there will be no atmospheric adhesion, and the teeth will be practically useless.

Dr. Atkinson refers to some prospective improvement in casting plates. Twelve years ago Dr. Bean, of Baltimore, who was then experimenting with his aluminium plates, told me it would be quite as easy to cast a gold or silver plate as one of aluminium. The specific gravity of gold or silver being so much greater than aluminium, the probabilities were that there would be less difficulty in the metal finding its way into every part of the matrix than was the case with the lighter metal aluminium. Dr. Bean's process was a very beautiful one, and it was very successful as far as the method of making went, but it was one that very few men could accomplish on account of the difficulty of the manipulation and the care that was required. It would be very much easier to swage a plate, and any skillful man who knows anything about that branch of his profession can swage a plate to fit just as perfectly as one made by casting. I see my friend Atkinson shaking his head negatively, but there is one matter that he seems to forget: a plate that is cast must be the size of the plaster model. The plaster model is always larger than the mouth. Every one knows that a plate that is made to fit exactly upon the plaster model must be a little larger than the mouth, and that is an element of trouble at once. A plate should be somewhat smaller than the mouth to compensate for the depression of the capillaries and the change and absorption that takes place along the ridge. By way of illustration, if a plate be made to fit the cast perfectly, and be then introduced into the mouth, it will, in the course of a few days, be found to press a little hard upon the roof of the mouth, and not so hard upon the ridge. That is wrong, it should press in the first place a little unduly along the

ridge, and should be a little loose at the palatine arch, for the certainty is that it will in a few days adapt itself to the ridge, while the palatine arch is stable.

That is the result of the experience of everybody, I think, who has watched the matter closely.

Dr. Stellwagen: My object in taking the floor is to call attention to a method of adapting metallic plates to the cast of the mouth, which seems to be known to but few. It was first, as far as I am aware, attempted by my friend and student Dr. M. H. Cryer, of Philadelphia; and I think that by this method we have had some of the most wonderfully successful adaptations of plates to the mouth that I have ever seen. All who have swaged plates know that sometimes the counter die is beaten out of shape, the plate stretches at one point or more, making it thinner and larger at these points. In order to avoid this distortion of the plate, Dr. Cryer devised the plan of squeezing it between the two dies by means of a screw. I would recommend those who are interested to give it a practical trial. I am not prepared exactly to explain the weight and size of the screw, but know that the earlier trials were with one arranged for celluloid work. It was broken several times, but was strengthened by means of screw bolts and nuts, with heavier plates and a longer lever put in. The same apparatus is still in use in the doctor's laboratory. It has the effect of gradually coaxing and pressing the plate into the shape desired.

Dr. Butler: I have a few words to offer upon the manner of swaging metal plates. Professor Stellwagen has referred to a gentleman in Philadelphia pursuing the plan of raising them by pressure, or by press-work. It is contrary to all accepted and practiced modes of raising metals into irregular forms. The idea is that you may avoid the stretching of the plate irregularly, thus producing an imperfect adaptation. The plan of casting has been referred to. I have some doubts about it being ever practicable, as the manipulations must be carried through so very nicely that there are few that will give it that attention that would be required to make it a success. All workers in jewelry construct their irregular forms by what is called a drop-press, and not by screw pressure at all. The most perfect adaptation to the die that is possible to be made is made in that manner. You cannot coax metal into irreg-

ular forms in that way so completely as you can by the generally accepted one. Plates, whether of gold or platinum, can be swaged into shape with very much less force than is ordinarily applied, and the expansion of the plaster model is compensated for by the shrinkage of the zinc die; and the simple stretching of the lead, if the zinc is of sufficient depth to give it strength, so that it won't give, is of no practical objection.

After a moderate amount of force has been put upon the die, and you find that the lead is being stretched, it can be easily driven up by simply holding the die in the hand and driving around upon it, carrying the gold with the lead down more perfectly and with less stretching into the irregular shapes than you can by the screw process. With reference to the subject of Artificial Dentures, as a whole, for some reason it has seemed to have had very little attention for some years past, and it is a thing that we cannot do without. Perhaps we may outlive the great demand that now exists, but at present there are millions that demand these things at our hands, and we should be able to meet that demand in the best manner. That is the point; and if, as Dr. Stockton says, we are not able to do it with our own hands, we should at least be able to give the proper instruction for some one else to do it for us. There are many of us who do not know how to give the proper instructions to a workman to raise plates for us. There are some cases where it is impossible for the mere mechanic or artisan to do it. There are certain features about such cases that make it imperative that we should be able to do the work ourselves in order that we may obtain the best possible results.

Dr. Rehwinkel: This discussion would not be complete if nothing were said about warped and twisted plates. It has cost me many dollars and a great many speculations about its possible cause, and I was perhaps accidentally led into the way which I thought put me upon the right track. We know that the old Mexican dollars were always considered very fine coins for mechanical use. You would sometimes find one which was all right, and would work very well. Again you would get one, one-half of which would work well, and the other half would be stubborn and rebellious under the process of swaging. What was the cause of this difference? Evidently a carelessness in alloying the metal. A five-franc piece, no matter of what coinage it may be, will always

work with greater uniformity than any of the former coins,—a fact which I attribute to the greater art of the mechanic in alloying the metal. Having observed this, I was led to inquire whether the warping of plates was not frequently caused by the imperfect manner of alloying. A good many dentists who are able to work metal at all will recollect that it was sometimes a good half day's work to refine a lump of gold which was very impure, to bring it into condition so that it would work at all. Now, by frequent melting the alloying becomes perfect.

I want to allude to a process of overcoming the heating which celluloid or rubber plates occasion in the mouth, producing uncomfortable sensations; and that is, lining the plates with a thin plate of gold. On the outside there is an attachment with a very narrow strip of platinum twisted up in the shape of a spiral spring and brought out into a coil. It is simply put around the edge, so that the rubber will embrace it and become thoroughly and firmly attached all around the edge. In vulcanite or celluloid the plate is put over the model and pressed into the matrix. You will find that this device will do away with the tendency to sore mouth and remedy the difficulty where a trouble of that kind does exist; at least it has succeeded with me in three very marked cases.

Dr. McDonald: In my early practice I had considerable difficulty in the warping of metal plates. In looking around for an explanation, it seemed to me to be caused by having too much alloy either in silver or gold, or by using too large quantities of solder. I discovered it was better to have pure silver and no alloy. I was taught that 22 karat gold was too soft to make a dental plate, or that it would bend in use. My experience does not sustain this doctrine, and for many years I have made all of my plates of 22 karat gold, using American coin, and I have had no trouble from warping, either after they were swaged, in annealing them, or in soldering on the teeth, and I do not recollect a case that bent afterward.

Dr. Stockton: With reference to what Dr. Stellwagen has said, the shaping of plates by means of screwing dies together does very nicely, saving much trouble; but when everything is done with the screw, then you want one or two sharp, hard blows to send the thing home; 20 karat gold, with 18 karat solder is the material of which to make plates. I intended to

have said before, if you have only one good root left in the lower jaw, do all you can to save it. Place upon it a crown, the best way you know how, and it is worth hundreds of dollars to the wearer in steadying and supporting the artificial denture.

Dr. Essig: I simply want to say a few words concerning the point which Dr. Rehwinkel mentioned, and that is the tendency on the part of the constituents of alloys to separate when in the fused state. Between certain metals this tendency exists to a considerable extent, for instance between tin and platinum, or between silver and platinum, and also between silver and copper. Between silver and copper the tendency is so great that, at a certain temperature after the two are melted together and perfectly incorporated, the copper will separate from the silver and form a different alloy of its own. Sometimes it is perceptible; take an ingot of silver and it will be observed that veins of it are somewhat red in color. Of course this would be a good reason for the warping of the plate. I also want to refer to the press that Dr. Stellwagen spoke of in his remarks. Any one that desires to test the relative effect of persistent force and percussive force can do it by attempting to swage a plate of iridiumized platinum or iridiumized gold. It will be found impossible to swage a plate properly by persistent force, but it will be found comparatively easy to effect it by percussive force; I mean by the use of a hammer.

Dr. Stellwagen: I am not certain but that Dr. Cryer may strike a blow at the last part of the adaptation of the plate, but getting the plate down to that point where the blow tells uniformly, is effected by the screw.

Dr. Crouse: There is another process in artificial dentistry which has not been spoken of here, which I think well of, and those who have used it more than I have think more of it than I do, perhaps; this is the setting of artificial gold crowns upon roots,— a method introduced into this part of the country by Dr. Richmond, of California. I have been surprised in a number of cases, upon an examination of them, to see how beautifully they work. I was very much prejudiced against the idea of driving gold around the necks of the teeth, supposing it would keep up an irritation; but those who have used it most assure me that it does not, and from my observation I think there is very little

objection to it on that account. I had the pleasure of examining, a few days ago, an operation of that kind, where a gentleman had placed a gold crown upon a front tooth, and had attached to it an artificial tooth to fill the space adjoining, where there was no root, and it was working beautifully; so that it looked as though it was going to be a success, the root supporting the gold crown and the tooth attached. I have been speaking to some gentlemen since I have been here who have set a great many of them, and all seem to be much pleased with the operation.

Dr. Taft: I greatly desire that something might be done, either by law or some other way, to arrest the wholesale slaughter of teeth that prevails to such an alarming extent. This abuse has come in like a flood since the indiscriminate use of anæsthetics. In every city there are places where they make extraction of teeth a business. They not only remove teeth that ought to be removed, but often a great many that ought not to be removed. I sometimes have occasion to get teeth from these offices for the use of students, and I am pained and surprised to see how many of them might have been retained and made serviceable for many years. Judging from appearances, I should say that from two-thirds to three-fourths were such teeth as dentists are in the habit of saving,—just such as many of you have treated ten, fifteen and twenty years ago, that are to-day serving all the purposes of the natural teeth just as well as they ever did. There should be some way of arresting this practice. If the states that are enacting laws against empyricism could bring legal enactments to bear upon this practice with crushing weight, a great benefit would be wrought for the public, and for the dental profession as well. Every man who indiscriminately takes out teeth is a criminal, and ought to be punished.

The preservation of the roots of teeth I regard as a very important matter in many instances, and in practice I have retained and preserved all roots that were in any way valuable. In the extraction of teeth, and even in the removal of roots of teeth, the dentist should be put upon the same plane with the surgeon, and it should be no more lawful for him to remove a tooth from the mouth that might by skillful treatment be made serviceable, than for the surgeon to take off a hand that could be preserved and made an useful member. What would we think of the surgeon

who would take off every finger, every hand that might have inflammation, that might have an abscess, every toe that had a corn upon it, every nose that had pustules upon it! Would there not be just as much propriety in doing that as there is in taking out all slightly diseased teeth, or such roots of teeth as can be retained in the mouth in a state of health and be useful to the possessor? Roots of teeth treated twenty years ago or more are to-day just as comfortable and serviceable as they were then, and so I hesitate to take out roots of teeth. Whether plates are to be inserted or not over the roots, they may be made serviceable. It saves mutilation of the features, which necessarily occurs in every instance where the roots are taken away; and when the symmetry of the face is destroyed it can never be restored. This is the rule; there may be exceptions.

A method of supplying artificial crowns upon the roots of all the teeth, even those of bicuspids and molars, has been devised by Dr. Peabody, of Louisville, Kentucky. For this method the tube teeth made by C. Ash & Sons, of London, are used. The root is dressed as usual for inserting a pivot crown. The crown is then fitted upon it and articulated with the antagonizing teeth. Then open and enlarge the canal, or canals. If a molar or bicuspid, enlarge and form these so they will receive a staple from one and a half to two lines in length, made of No. 16 to 18 platinum wire, Stubs' gauge. On the bow of this staple solder a platinum wire long enough to reach through the tube in the crown, and large enough to fill the tube. On the free end of this wire a screw should be cut and a nut fitted. This tube in the crown surface of the tooth should be counter-sunk to receive the nut quite below the surface.

The root and staple prepared, the latter is properly adjusted in the former, so as to bring the crown in the proper position, and fastened by filling round it with gold, amalgam, or any practicable material. This being done, if a plastic material is used, sufficient time should be allowed for it to harden before putting on the crown, or at least before fastening it. When this is done the crown is fixed in position with the nut already mentioned. This nut should be covered by a filling of gold.

For a tooth with a single root, a straight rod with a screw upon it by which it may be fastened into the root will take the place of

the staple. In other respects the mode of procedure is the same as that already described.

This is a very good and practicable method of setting artificial crowns of teeth. Dr. Peabody informed me some time in June last that he had practiced this method the last three or four years, and that it was thus far eminently successful.

DR. MCDONALD: I wish to indorse everything that Dr. Taft has said. I say with him, what can we do? I ask you as a profession who desire to save natural teeth, shall we hold out the right hand of fellowship to such men when we know they are murdering those teeth every day? Dr. Taft says they are robbers, and still we meet with these gentlemen, and extend to them the right hand of fellowship. Whenever I put my eye on one of those men I say to myself, and I cannot help saying it, you are a fiend; you are working for the purpose of making filthy lucre by destroying your race and making their days shorter; and I say the first thing we must do is to ignore all these men.

DR. CLUMP: I rise to indorse all that has been said in regard to the indiscriminate extraction of teeth. The practice is not confined to large cities. There are men who travel around from house to house and from door to door soliciting patronage who do this. It is not necessary to make any extended remarks in this direction, but there ought to be some way to stop it.

DR. BARRETT: I wish to know if in those states where they have good and sufficient legislation, where the profession is thoroughly organized, it is not possible for the profession itself to prosecute such men for malpractice? We denounce these things, these Colton institutions, when we get together by ourselves, but when we get home some of us will send patients to these very places. With a great air we boast that we extract no teeth, and then whip the old boy around the stump by referring our patients to these butcher shops. How many men of those who are called first-class practitioners in the city of New York send their patients to just such places as these, and how much better are they than if they did the same disreputable work in their own offices? In my own city I know a case where there were two decayed bicuspids, one upon each side, and the patient went to one of these places to have them removed. An anæsthetic was administered, and when she recovered she found they had begun with the bicuspid on one

side, the least decayed of the two, and had gone clear back and extracted the last molar tooth, and were commencing on the other side. She left the place, having paid very dear for a lesson that might have been learned by proxy. That man was guilty of malpractice, and if I had done my duty I would have strongly advised her to sue him for damages. The great trouble is that usually such men are not responsible, and you have your own costs to pay.

Dr. Hunter: I indorse what has been said with reference to the indiscriminate extraction of teeth, and saving all teeth that can be saved; but gentlemen have advised doing something about it, and the question is, what is to be done? How can the people be educated properly upon these subjects, and dentists be influenced to do right, and thus remedy what is complained of? People are in the habit of going to dentists and dictating what they shall do, just as they go to a mechanic and dictate to him what they would have done to their machine, boot or shoe; and, if they are told that that is not the proper thing to do, and you cannot do it, they will say I will go to somebody that will do it. It was for the purpose of information that I came to this Dental Association, and I have been greatly benefited by attending this and our State Dental Association, and I hope to continue to be benefited and stimulated to higher and better attainments, the better to serve my patrons. I find that there is a great deal that you call malpractice, and I find myself sometimes very much puzzled to know what to do with the patients before me, because I cannot influence them to have done what it seems to me proper to be done.

There is quite a large number of practitioners in large cities that have made reputations and receive patronage mostly from the wealthy classes, that can and wish to pay for nothing but the best, and people come to know that what they have such men do must be done in accordance with their standard of operating and practice, and do not attempt to dictate their manner of operating; or, if they do, very soon find that they have made a mistake. There is another class of people that never patronize the best dentists in these same cities because they cannot afford to pay high fees, and seek the services of a cheaper and inferior practitioner, and dictate how their work shall be done, and manipulate prices somewhat to their liking.

There is, I believe, a larger proportion of the latter class of persons seeking dental operations in smaller cities and country towns than in large ones. In very many instances the conscientious practitioner may be able to successfully advise persons in small towns, but in more instances he would meet with—if you won't do what I want done I will go where I can get it done. And the dentist is many times constrained to yield his judgment and do the work because he believes he can do them better service than they will receive if he lets them go to his competitor. And then he feels that he cannot afford to let all such patronage go from him.

Dr. Thomas: I have advocated for some time, as some of you perhaps know (and the more I hear this matter discussed the more thoroughly I am convinced that I am right), that the only thing we can do, is to cut ourselves off from this *business* of making artificial teeth. Mechanical dentistry has got such a hold upon the people at large that all the discussion that can be had, in bodies of this kind, cannot affect the men that are doing this kind of work. Dr. Taft says, "bring them up before the law and prosecute them." I would ask Dr. Taft, where can we find a judge or a jury competent to decide as to whether they were guilty or not, as the errors of the ignorant physician are covered by the grave, so the works of the unscrupulous tooth-puller are hidden by the use of the forceps. The thing cannot be done in that way; and therefore I say it is the business of the dentist to hold out the inducement to the public that his *only* business is treatment of the natural organs. One gentleman has said that "we fraternize with these men." So we do, more or less, and so we must, and we acknowledge them, in a measure, as dentists.

The matter of gold crowns has been spoken of. A great deal more can be accomplished by that kind of treatment than some may believe. The mode that was introduced by Dr. Richmond meets a want that it seems to me we all ought to know more about. As Dr. Crouse has said, when I first saw the work I was prejudiced against it, thinking it would cause absorption, and that there would be constant trouble. I had one put upon a molar in my own mouth, that I must say has more than satisfied me. I know no difference between it and any of my good teeth that are healthy. That gold, as you all know, is driven *over* the root so

that there is no chance for any secretions to get in at all. I have set several of these gold crowns, and they have more than met my expectations. It seems to me if we give our attention to this matter of saving teeth, in some such way, we can avoid the manufacture of so much artificial work as is demanded at the present time. We have got to do something, and the only thing we can do is to lessen the demand for that kind of work.

Dr. Bogue: If you cannot get hold of them by law, perhaps you can by gospel. There has been an effort made to indoctrinate the people into those things which go to make up a perfect denture well cared for. I would like to inquire what state there is that has not a dental law.

Dr. Taft: I had reference only to the laws that are in existence in several states bearing upon the subject of malpractice.

Dr. Friedrichs: There is a law of that kind in Louisiana, and I know of a case where a gentleman recovered five hundred dollars for the loss of a tooth. This, however, was not a case of malpractice, as the tooth was knocked out in an assault.

Dr. Bogue: With a view to making a reply to something that was said by Dr. Barrett. He asks, "who refers patients to such men as those who keep dental slaughter houses?" I do. "Who will do it again when he goes home?" I will. I will tell you another thing that I will do, and if I am in error I will stand corrected. I will send with every patient who goes into these "slaughter houses" a chart, and my written directions what teeth shall be extracted.

Dr. Spaulding: Will those directions be followed?

Dr. Bogue: They will, or that man suffers the consequences at my hands. These men may be just as unworthy as has been stated, but that very unworthiness has given them an amount of practice, and therefore a facility, which we, who do not extract many teeth, and do not allow many teeth to be extracted, do not have. I cannot extract teeth as well as I could fifteen years ago; I have had no practice worth mentioning for fifteen years, and few teeth that have been under my care have been extracted. I have made that statement before and I reiterate it here; but when teeth must be extracted — for regulating purposes, for example — I send my patients to a man that can do it under gas, as a matter of economy of time to myself and advantage to the patient, and

I will guarantee that no man practicing extraction for a living will disobey your instructions many times if he knows that you mean business.

DR. FRIEDRICHS: I think I will illustrate what I wish to say by telling you a fact, not a story. I have a friend in Louisiana who has a brother practicing in Switzerland, and he eventually succeeded in getting his brother to go there, stating that dentists stood in higher appreciation there and were better paid. So this friend of mine went to Neufchatel. One day a patient came who was suffering intensely from toothache. When he saw the case he put him into the chair, and asked him if he wanted to be relieved. He said yes, he came there for that purpose. Of course he went for the forceps, and the patient said, what does that mean? I wish to extract your tooth. No, sir, that tooth is worth five hundred francs. Ah, said the doctor, that is another thing, and he laid the forceps down and went to treating it. If our patients were educated to that point, with that appreciation of their teeth, you could send them to all the Colton institutions with impunity. I believe the proper remedy is to educate the people to the value of their teeth.

REPORT OF SECTION TWO

ON

EDUCATION.

By J. N. CROUSE, Chairman.

NOTWITHSTANDING the assertion which has become so familiar to us during the past few years—that the subject of Education has been exhausted, and that the time spent in discussing it is time wasted, your section on Dental Education believe there is no subject of greater importance for this Association to consider.

The growing sentiment on the part of the profession at large in favor of raising the standard of Dental Education has been recognized by the colleges to be imperative, and has resulted in many of the advance steps recently taken by them; and this sentiment is due largely to constant agitation and discussion of the subject. Were discussion to cease, progress would cease; and a profession can poorly afford to rest on laurels already achieved.

The following points this section thinks should be most strongly insisted upon by this association:

1st. That all dental schools shall demand some degree of proficiency in English education as preliminary to entering upon professional study.

2d. That the colleges shall grant no diplomas except to those who attend at least two full courses of lectures.

Except that practitioners of dentistry who present satisfactory evidence of having entered upon practice prior to July 1, 1875, and of having continuously followed the same from that date shall, until July 1, 1885, be entitled to present themselves for examination for the dental degree after attending one course of lectures in a duly recognized dental school.

3d. That this association claims the right to exercise a general supervision over the whole subject of dental education.

In regard to our first proposition, the question very naturally arises, "What attainments shall be required of students entering our dental schools?"

The English Parliament has recently passed an act that dental students shall hereafter pass a good preliminary examination before they begin their professional training.

Under this law, the prescribed examination covers English, Latin, Arithmetic, Algebra, Geometry, Geography, English History, and any one of the following branches at the candidate's option: Greek, French, German, Mechanics, Chemistry, Botany or Zoölogy.

To attempt the establishment of such a standard of preliminary education in this country would perhaps not be practicable at the present time; we are not sufficiently well organized to secure such a law or enforce so desirable an advance. Yet this section is of the opinion that all the colleges should at once take an advance in this direction and require at least a *good English education*, and in addition should require the applicant to have sufficient knowledge of the branches taught and the language employed to comprehend the lectures.

There is no advancement proposed which the profession at large, outside the college faculties, are so unanimously in favor of as that of requiring a good English education as preliminary to entering upon professional study.

Second, your committee deem it very desirable that some unanimity of action be observed on the part of the colleges in regard to requirements for graduation.

On this point there is at present great difference. Some allowing five years' practice as equivalent to one course of lectures, some granting diplomas without requiring the applicant to attend lectures, and others requiring two full courses of lectures of various length.

If the colleges cannot agree upon some uniformity of action, this association should take steps to aid them in uniting on one basis.

While acknowledging the justice of the principle that a man should be entitled to a diploma when his acquirements come up to the proper standard, no matter where he has obtained his education — yet this association cannot sanction the issuing of such

diplomas by parties who are pecuniarily benefited thereby; as college faculties, like "Cæsar's wife," should be above suspicion.

Hence your section feel that colleges should not grant diplomas to those who have not attended lectures, and that the policy of allowing five years' practice to equal one course of lectures should be abandoned.

This brings us to our third proposition, viz: to place the colleges and educational interests, to a certain extent, under the general supervision and control of this association. This proposition is brought before this body at this time for its consideration in the full belief that the power judiciously used would render the association of great assistance to the colleges in effecting needed reforms.

Some action was taken by this association at its last meeting which was calculated to remedy the evil of colleges allowing five years' practice to equal one course of lectures, but it did not have the desired effect. For, although the association did not refuse representation to such colleges as pursued this policy, it expressed in strong terms its disapproval of the practice of dental colleges graduating students upon less than two full courses of lectures, believing it to be detrimental to the interests of dental education, and advised the omission of such inducements from their annual announcements; yet, so far as this section is aware, none of the schools that pursued the five-year policy at that time have abandoned it; and the new schools which have sprung into existence since that action, each offer the five-year practitioners the inducement of a diploma by attending one course of lectures.

Even more, one of the largest schools that had previously abandoned the policy, publicly announced their intention of accepting the action of this association, and would thereafter regard five years' practice as equivalent to one course of lectures, and would receive such as candidates for graduation after attending one course of lectures; as though this association had recommended the practice instead of condemning it.

Therefore, this association needs to take some more positive action in regard to this matter than has heretofore been taken, and in language that cannot be misconstrued. This section, therefore, would offer the following resolutions.

Resolved, That hereafter no dental college shall be entitled to represen-

tation in this Association, that does not require a good English education as a preliminary qualification for its matriculants, to be ascertained by examination.

Resolved, That the colleges shall hereafter grant no diplomas, except to those who attend at least two full courses of lectures. Excepting that practitioners of Dentistry who present satisfactory evidence of having entered upon practice prior to July 1, 1875, and of having continuously followed the same from that date, shall until July 1, 1885, be entitled to present themselves for examination, for the Dental degree, after attending one course of lectures in a duly recognized dental school.

Resolved, That no dental college shall be eligible to representation in this Association, that does not, in its next annual announcement, give notice of its adoption of this limit to the conferring of the degree.

[These resolutions were adopted: see minutes.—*Pub. Com.*]

This section can but express great anxiety at the evident tendency to multiply dental colleges evinced by the birth of three or more since the last meeting of the association.

Even conceding to their founders all that they can claim, neither of them can, in the nature of things, hope to equal the best of those before in successful operation.

It seems to your section that the association should, by a decided voice, discourage this multiplication of schools which, in their opinion, can but tend to lower rather than raise the standard of professional excellence. Concentration of interest in, and effort for, the best of those longer established would surely tend to the greatest advancement.

Regarding the question of whether dentistry is a specialty of medicine, or not, as unimportant, yet believing that a medical education is a desirable preliminary to that of dentistry in the attainment of the highest success in its practice, we would urge the advancement to that acquirement by graduates in dentistry at the earliest practicable day.

DISCUSSIONS.

Dr. Spalding: As I dissented in the meeting of the section from one of the items in the report, I claim the privilege of giving my views upon that special point, which is the last one stated, namely, that the section regrets the establishment of additional dental colleges. The general expression in the section was that they did not want any more dental colleges, that there were too

many now. I dissent in toto from that idea, and say that we have not half dental colleges enough. The only point to consider in the establishment of dental colleges is their quality. Bring them to every man's door, induce every man who contemplates entering the dental profession, however poor he may be, to enter a college and go through a regular course, and enter the profession by its regular door, and not feel obliged from his financial necessities to climb up in some other way. If we have a number of noble hearted and enthusiastic men who are willing to devote their time and their means to the cause of education, and who choose to organize a dental college at any crossroads, if you please, and gather in the candidates for dentistry who happen to reside within their territory, and educate them properly, shall we say no, you must not do that, if these young men cannot go away to some distant point they shall not have any such facilities to get into the dental profession, they must get in the best way they can? The grand idea is that we must make the holding of a dental degree an uniform thing throughout our entire land. The time is fast coming when no man will be recognized as a dentist who does not hold a degree. How is it to-day? Not one-fourth part of the practicing dentists of the United States hold degrees, and more than that, not more than one quarter of those who came into the profession in the year 1878 held degrees; and now the proposition of this section is to diminish these facilities so that in the future we should have, perhaps, ten per cent. No! if we ever hope to be a profession, if we ever hope to see the day when every man in our ranks shall be an educated man, we have got to extend the facilities for education. I think the proposition is a step backward, and I regret to see a body like this take it. We should be for onward movement. I, of course, voted against this expression in the section, but I believe I stood pretty much alone, and therefore the chairman was justified in saying that the report was nearly unanimous. I am reminded by the chairman that I have been in favor of conferring degrees upon competent men who have not attended two courses. My doctrine has been, that when a man can come up to the proper standard we should not stop to inquire where he obtained his information. The question to consider is, is he competent? and if he is, let us give him the evidence thereof. The section have considered the matter of making some provision for

that class of men who do not hold degrees. No very definite proposition has been entertained, and nothing done, except the provision contained in one of those resolutions, that every man who commenced practice previous to July 1, 1875, and has been in continuous practice since, may, upon attending one course of lectures, obtain a degree. I have no definite scheme to propose. In fact it has not been sufficiently digested, and the only object of these remarks is merely to save that point in the whole question. One important suggestion was made, and that is that the examination of such candidates should not be made by the faculty of the school that grants the degree. In that I most heartily concur. I think the examination should be made by entirely disinterested parties, and I will go further and say that the fees which he pays for his degree should not result to the pecuniary advantage of the institution that grants it. They should have nothing more than enough to pay the expense, and the balance should go to some other fund.

Dr. Bogue: I feel very much like endorsing all the ideas that Dr. Spalding has expressed. I do want that word anxiety or regret put into that report, for the reason that Dr. Spalding has expressed. To begin at the latter end of his remarks, I believe he is the first gentleman connected with any dental college who has here, upon this floor, announced his acceptance of the doctrine that the examining board should not be under the influence of the teaching faculty. I honor him for that expression, and it seems to me that it will not be very long before that view will prevail much more extensively than it does at present. No one who has looked carefully at the working of dental or other colleges can have failed to see that the influence exerted by even two, or three, or four months of intercourse with the student must bias the professors. Dr Spalding asks what we shall do with young men who would enter into the practice of dentistry through some other door than the colleges? I think we should pass state laws and keep them out, if they will not enter through that door. It seems to me that is the tendency of affairs, and as these state laws are passed, one by one, the young men who desire to enter into the practice of dentistry will necessarily go through a process of natural selection — those that should never come in, so far as we can arrange that matter, will not come in, as they will be obliged to go

through the colleges to obtain their object. Hence the multiplicity of dental colleges I look upon as a necessity to be regretted, but still a necessity. I fancy that they will be wanted. The good ones will stand. When Dr. Spalding suggests that we should make an uniform degree which should be imperative throughout the length and breadth of the land, I wish to concur with him. These ideas are presented more vividly to me at this time because I have been noting the far-reaching tendencies and powers of that English law which has been alluded to. There may be two or three gentlemen in this room who know the ins and outs of that law; to me it is marvelous. There is a degree of feeling between the British professional men practicing dentistry and the graduates of American dental colleges, who possess, perhaps, finger craft, but who in other essentials of education may be infinitely below their English brethren, that is hard to understand and impossible to describe. It is not seen upon the surface, but it exists, nevertheless, and becomes manifest in the law recently passed, which recognizes the graduates of only two of our thirteen or more American colleges. One of the causes for the passage of that law, which is a far-reaching, and in my view a most wonderful, enactment, was the practice of English students of going to America for their second course, or their graduation, whence they would return legally "Doctors," while their qualifications as professional men, or for social standing, were greatly below those who had staid at home and gone through a course of training much more profound and searching than any of ours, and yet were not doctors. This was a condition of things that could not long exist; so, as before stated, they have closed the doors against the graduates of all American colleges, save two, although the right is reserved to extend the list of those whose diplomas will be recognized when it shall be proven that the curriculum of any other school shall be equal to the requirements.

Dr. Stockton: I have thought the great thing was to have only a few large dental colleges in the land. I was in sympathy with the resolution of the section, but I must confess that since Dr. Spalding has spoken I have somewhat changed my mind. There are a great many young men coming into our profession through our state boards, and these examiners cannot be so well qualified to give a certificate as those who have been long teach-

ing in the schools, and I therefore have, since sitting here, come to this conclusion, that it is best to say to these young men, you must go to the dental colleges and take your diplomas, no matter whether they staid there one year, one month, one week, or one day, if they are qualified to practice Dentistry; and if they are qualified to practice the college should give them the certificate; but the examination should be such, and the degree be such, that when once given, it would never after be questioned. We are making dental colleges all through the land in almost every state, and if you open these dental colleges where men can get their degree, they would rather have it than from any examining board. Make it so that they can get it without expense, but have the standard so high in all that which pertains to Dentistry, and also with reference to their English education, that it will be beneficial to the young men. We know that those who have had a previous education, such as it ought to have been, when entering our profession, take the highest rank among us. I believe this will be the grand solution to this question that is before us to-day.

Dr. SHEPARD: I move that the motion that this report be adopted be laid upon the table.

The motion was agreed to.

Dr. SHEPARD: I now move the adoption of the resolutions, which brings the whole matter before us for discussion.

Dr. SMITH: I would like to read some statistics. It is affirmed that there are in the United States 12,000 practicing dentists, those who have a local habitation and a name. I think it is a proper estimate that there are legitimate students of dentistry, with those 12,000,—at least 1,800 to 2,000, who contemplate pursuing dentistry as an occupation. Last year the matriculants of all our colleges numbered 672, of whom fifty were foreigners, leaving about 622 matriculants in our colleges from the United States. It is curious to know where those students come from. I cannot give you the statistics as to where the matriculants come from, but I can only give you the statistics as to where the graduates reside. Before proceeding to that point I will state the number of graduates. There are sixteen states who graduated 158, all the other states 51, giving 209 graduates altogether in all the colleges from the United States. This is nearly accurate. There were thirty-three foreign graduates, making 242 graduates in all. I have esti-

mated that there are from 1,800 to 2,000 legitimate students, which would give about fifteen to every 100 in practice. Now you see if all the dental students went to college each college would have about 200; but, as it is, as we only have about one-third in the colleges, some of the present number of colleges are impoverished for want of students. You will not find as many students in large cities with practitioners as you find in the country. I know of some country practitioners who have three or four. There is Illinois with her 400 dentists; last year she had three students that graduated, possibly four. There were about nine students in the colleges from this state, because the graduating list indicates the number in the colleges. Some of the colleges graduated four, others two and three. Harvard, the more advanced college, had thirteen students, and graduated but two or three. These are some of the facts which have a bearing upon the subject, and it is well to consider them when you theorize about dental education. Especially should members of this section ponder the status of dental education in their own states while proposing changes called reforms in the methods of the colleges.

Dr. Crouse: How do you get at the number of students, if you call them students, that there are in the United States; how do you make it 2,000? And I would ask another question, How long would it take to multiply the number of practitioners from 12,000 to 50,000 at that rate of students each year?

Dr. Smith: It is an approximation. It is my judgment and that of others. Probably there are large numbers retiring. And there are many who are not fit for the business of dentistry, and very soon engage in other occupations.

Dr. Crouse: They never go out.

Dr. Smith: They go out very frequently from a variety of causes. Not a few are unable to make a living.

Dr. Shepard: As a matter of fact, the statement with regard to Harvard is not correct. There were five graduates last year, 1878–9, out of thirteen in the class,—in 1877–8 there were six graduates with a class of seventeen.

Dr. Smith: I don't claim accuracy of course. It is an approximation.

Dr. Crouse: The question is now, what are you going to do about it?

Dr. SMITH: That is for you to say. Some say, advance the standard of dental education. I have my reply, but I am not giving that. It is peculiar that the large bulk of students came from very few states. Last year Pennsylvania had 39 graduates, Ohio 24, New York 18, Massachusetts 17, and Maryland 15, making in all 113. Those five states, it will be observed, had more than half, and the balance of the states had only 96. Of those states, Pennsylvania, Ohio and New York have state laws regulating the practice of dentistry. We find, also, that in those states are located the older dental colleges.

Dr. COOK: In regard to New York, I will say that the law now in force does not affect, in any way, the number of graduates. There is nothing in the law that requires any man to take a degree. There is a law, passed at the last session of the legislature, but not in force yet, that may possibly affect the number of students at our Dental schools.

Dr. SMITH: Where there are facilities for obtaining dental education we find the largest number of graduates. Those states which have had dental colleges the longest time furnish the bulk of graduates.

Dr. BOGUE: I am reminded that I conveyed a false impression. I stated that the college of surgeons in England were able, in view of this law which has lately been passed, to extend their time and enlarge their curriculum. In so doing I put the thing exactly back-end foremost. They did extend their time, and they did call for an examination in arts, and then they found their classes dwindling. The law was the remedy for that.

Dr. COOK: I would say *a* remedy. The discussion in reference to a law in the United Kingdom, regulating the practice of dentistry, commenced some three years before it was passed by Parliament. Large meetings were held at various points in the kingdom and all questions bearing upon it fully considered, all of which is a matter of record. There is no reason to believe that the presence of a few American dentists in England, or the desire to keep their students from going abroad to procure a diploma on qualifications inferior to those required at their own schools, was the exciting cause of the demand or request for a law. The same reason might as well be assigned for the passing of "dental laws" in our own states. If I rightly understand the last speaker, his

remarks do injustice to our friends over the sea, and I think I pretty well understand what has been said and done, as far as their journals make record. I do not see the injustice of *not* permitting the registration of foreigners on qualifications inferior to those demanded of their own people. It would seem to be only justice to their own licentiates that such discrimination be made.

Dr. CROUSE: I did not intend to speak upon this subject, but, as the discussion has taken a conversational turn, and seems not to be leading up to the points under consideration, which are the resolutions before us, I wish to say a few words. The first of these resolutions requires a preliminary education for those entering the schools. This, in my opinion, is a step that all colleges can judiciously take, and I think this Association can, by its voice, assist them to that advance, and, as near as I can find out, it is the desire of all the colleges that this advance step should be taken. We were enthusiastic in our section on the passage of this resolution, and I think it needs no discussion. The gist of it can be seen at a glance,—that we should have an examination in reference to English education, and would-be pupils should have a sufficient knowledge of the subjects to be taught, to enable them to comprehend what the lecturer is talking about. If the pupil enters college without any knowledge of anatomy or chemistry, he will not be able easily to comprehend the lectures upon those subjects, and his time will be, to a great extent, wasted. The second resolution is the one we had up last year, with an amendment. The resolution which I should like to see this Association adopt would be, that no college should be allowed representation in this Association that did not require two full courses of lectures; but as a compromise measure, and in order to have our report go in as the report of the section, we attached this amendment which allows colleges to grant diplomas to such as are qualified who entered the practice of dentistry before 1875 and up to 1885, giving about five years' continuance to that plan, with the understanding that after 1885 the five years' policy shall be done away with. In talking with the representatives of different schools, I am delighted to find that the tendency on the part of a great many is to make the course for graduation three years, instead of two,—an advance of vital importance; for what can the average student acquire of anatomy or chemistry alone in one or two courses of lectures.

He will not become an anatomist or a chemist in that length of time. This want of thoroughness in our schools heretofore will, in a measure, explain why we have had no report on chemistry this year. My friend Spalding has expressed a great deal of sympathy for the poor man. The fact of the business is there are many born to be poor men. They will be poor in the profession or out of it, and we can't help them. You present to the right kind of a poor man a plan for his education and he will work to it, if it takes two years or three years, and if he has not the material in him to enable him to do this, he is not fit for a dentist anyway. I had a young man in my office for a month, some time ago, and I said to him "you go back to your father's farm and stay; you will make a good farmer, but you will never make a dentist." If a man cannot get down to study, if he has no memory, if he has no application, and no mechanical ingenuity, he cannot make a dentist. It is no kindness to young men to make the educational standard low. After they get into practice and see that it would have been for their best interest to take a more full course, they will blame you for this easy method which you now so generously offer, and will say: "I wish you had compelled me to take a more full course and to prepare myself more thoroughly before I started to practice." Let us increase the facilities for real learning, and encourage those institutions that now possess them to the greatest extent. Many of these dental colleges are started from purely selfish motives; for instance, a dealer in dental materials starts one, believing it will be of advantage to his trade; a medical institution that has not a very large list of students attaches a dental department, hoping to increase its revenue, and enabling it to swell the numbers in its circular. I am sure that this multiplying of colleges mainly tends to cripple good institutions. A fellow who has any snap can pay the expense of attending two courses of lectures. If he has not vim enough in him to do that he is not fit for the profession.

Dr. Werner: I think dental education, like general education, a most important branch of sociology. Sociology and biology have close relations and move in the same course of development. This is a free democratic republic; we consider here that no laws are necessary to protect medicine or dentistry. In European countries it is considered necessary to protect the medical as well as the dental profession, consequently they have fewer colleges and

higher standards. As long as we have no law to protect our profession in America it is useless to talk of a few colleges and higher standards. That is the experience of older nations, and America will learn it very soon. England has decided by its law, lately enacted, to protect dentistry. America has not as yet spoken in that way. I am advocating laws to protect medicine and dentistry, unless we can rely upon the intelligence of the masses as sufficient protection. The masses do not think it in their own interests, or they would ask for protective laws. They do not ask to be protected from a lack of intelligence upon the subject. When they do ask it they will have just what they ask for.

Dr. ATKINSON: Who has been to the foundation? Who knows whether he has built upon the rock or the sand? What does the degree mean? We have sixty-five medical colleges chartered, and graduating pupils every year in the United States. Are there five of them that ought, by common honesty or legitimacy, to be permitted to graduate a single M.D.? We have thirteen dental colleges who graduate men for the practice of dentistry. We are trying to get at some means whereby to select from the mass of pupils that present themselves as matriculants to the various schools of dentistry, so that we can discriminate, and secure thereby efficient, honest, upright men, that shall be a blessing to the community, a comfort to themselves and an honor to their calling. How shall we do this? is the question before us. That is the underthought of every individual who has spoken, and I agree with all the speakers in a certain sense, and disagree with them all in a certain sense, and that is the sense we need not quarrel about; it is a sense of the disabilities that we have inherited from the abominable methods of our general education in the public schools, in the seminaries, in the colleges and in the universities, because they have built upon sand. When the weight of the building became great enough it toppled over. If I were required to make number-one dentists of 500 young men of good natural qualifications, I would prefer to have them without A.B., A.M. or M.D. attached to their names. And why? Because they have had such miserable methods by which to make these examinations, that they, every one, are false. There is not an M.D. in the United States of America this day that is not a lie upon the face of it. It tells what is not true, as to the qualifications of the man holding it.

It says he is entitled, by legitimacy, to all the rights and immunities belonging to this degree. Will you be surprised if I say what I have repeatedly said before, that I am sorry that there are any degrees at all? I see I am not making the other point. I said I would rather not have them with these false and mischievous methods of education upon them, but take them green and fresh, and in five years make them better scientists and operators than they can possibly be made by these men who have dubbed them A.B.'s, A.M.'s and M.D.'s as qualifying conditions. They have led to what the simple degree says, not what it means, because they do not know what it means. They do not have the knowledge of what it ought to mean. I do not say we shall be any more honest than our ancestors, and our predecessors, and teachers; but we shall be more illuminated, we shall have better light by which to direct our steps in the performance of the works conceived in our affections and intellects, and we shall be able to make less crooked ways to our feet, and we shall be able to be justified in our own consciences and the opinion of our pupils, if we will forget the old methods and begin to study anew, teaching our pupils conversationally and demonstrably. It has been said we have never had any report on chemistry. As differential chemistry, I hope we never may have a report on it. If we were to follow the leadings of these men who call themselves chemists, and offer the doctrine for acceptance, I hope we will never have. There is a chemical aspect to everything we do. We must learn a little about the old, dignified objective and subjective; and we must so understand these first postulates, as to enable us to be teachers that shall so commend ourselves to our pupils as to be sought for in places of trust and responsibility. I know what I say, I have seen what I speak of, and I testify the conviction of my own mind that we have no college to-day whose chairs are filled by men preëminently fitted to occupy the various seats in the various faculties of the various institutions.

Dr. Barrett: If I understand Dr. Atkinson aright, he would abolish all education whatever in dental institutions; for, if he says he would have them without any education, he necessarily goes back to that point.

Dr. Atkinson: By preference to taking such as they are. Don't misrepresent me.

Dr. Barrett: I did not use the words as he spoke them, though I might honestly have done so. He can put his own construction upon them. What is the point at issue? We are talking about the education that we have; how we can make it better; how we can arrive at a higher standard; whether by increasing the number of colleges, by establishing preliminary examinations requisite for entrance to colleges, or whether there should be no examination at all. The first resolution provides that there shall be such preliminary evidence of scholastic training. We are supposed to be considering the materials that are offered, and, if I understand the drift of Dr. Atkinson's remarks, it is that no qualification should be demanded of a student for entering a dental college. I think we will all take issue with him on that ground, because for the proper understanding of the truths of the principles that are taught in dental colleges, it requires some prerequisite English education. As a preliminary step, it is absolutely essential that a man have some knowledge of the construction of the language which is to become technical. But what shall be done? Is the door to be closed? Are we to relegate professional training to a few dental colleges? Is that in accordance with the demands of the dental profession, or of any profession, that it shall be only for the favored few? By no means. I think we should in professional, as in general education, open the door of opportunity to every one who comes knocking at the portal, and place the means of obtaining knowledge within the reach of every man. We may not all agree touching the general theory of the doctrine of evolution, but it will be beautifully adapted to the necessities of the dental profession as regards colleges, and will result in the survival of the fittest. Place a dental college at every four corners, if you will, simply premising that the teaching shall be sufficient, and the law of supply and demand will settle which shall live and which shall die.

Dr. Stellwagen: It is only by elevating ourselves that we can elevate our profession. If we individually are so exalted by education that every one who comes in contact with us will recognize that to be a dentist is an honorable calling, I do not think that we will be at any trouble about having laws to protect and laws to govern. As to how this shall be accomplished, of course there is a vast difference of opinion. At the very outset there is a question

as to what sort of material we shall make dentists of; in other words, what sort of men we shall admit into dental colleges. If I may be allowed to take exceptions upon the floor, as in the committee, I object to the narrow-minded view that a man must have an *English* education. The gentleman who preceded me spoke of sociology, and spoke very pertinently and to the point. Sociology brings about the study of a great variety of ologies, and among them is one which we call philology, and the man who is a philologist can quickly grasp a new language. Hence, for us to claim that a man must be educated in the English language is an assumption that will contract the scope of the profession. You are to require them to have an *English* education. What has it to do with dentistry to know whether the Plantaganet or the Guelph family happened to be the governing family of England? Teaching at dental colleges does not depend alone upon the use of language. There is a common language of science which enables two men, not speaking a common tongue, to have scientific intercourse with each other. A learned German, or a learned Frenchman, or a learned Englishman, all use technical terms nearly similar. In addition, education is imparted by means of illustrations and demonstrations. It is astonishing how readily a man not only acquires the art and science of dentistry, but at the same time the English language, by listening to the descriptions and seeing the manipulations before him. Hence, Mr. President, I should move that the first resolution be laid upon the table. It is exceedingly difficult for us at present, certainly it is too early for us, to establish any such line of demarkation.

With regard to those who are already in practice. How long does it take to examine a man and decide whether he is a practitioner or fit to become a practitioner of dentistry? I hold that it cannot be done in a few days or a few weeks, as some gentlemen here seem to think. Will any one be perfectly satisfied to endorse another by signing his diploma if he has been in view for a few days only, and had, perhaps, fifteen minutes' conversation with him in the way of an examination? If this be just, it opens the door to one of the most dangerous means for undermining the standard of our profession. It requires months of examination, as they stand in a class, as they answer the questions that are put by the examiners or the professors, to enable us to judge whether men

are fit to practice dentistry or not. It would be most desirable if we could have a board composed of the very finest talent for making this examination, that could spend enough time every year and perform the duty thoroughly. But any examining board that merely brings candidates before it for a few days, would be very apt to allow incompetent ones to enter the profession. With regard to the multiplication of colleges, we cannot *regret* the tendency to an increase in the number, until we see that they have done harm, but we can have an anxiety as to the results of such additions, because there are not sufficient students to support so many. I do not mean dirty dollars, but rather the stimulus of seeing a class around who look up to the lecturer, and drink in what he says, and awaken him to his best efforts. That is what I understand this association should express — an anxiety lest, by an overplus of colleges, the standard of education may be lowered so as to coax and persuade ineligible men to enter the colleges, in order to get sufficient classes. Does any school shut out worthy men for the want of money? We have had it said that the spreading of colleges broadcast over the land was necessary, in order that we should accommodate students who could not afford to come a long distance and spend much money. Those who pay for their tickets, and work for the money to pay for them, are generally those who become most creditable members of the profession. But there are others, such as our friend from Chicago has spoken of, who come begging their way through college and into the profession, and then beg their way through life. I have seen but few of these men who ever amounted to anything. It is the man that has the energy within him, and who says, if he has not the money, "I will sign a note and promise to pay it, I do not want an education for nothing," who makes his mark. Such can always be accommodated. I do not think any school in the country wants money alone. When I perform a dental operation I do not take the money as an equivalent for services rendered, but as an acknowledgment of that which money cannot pay for. Others may take the money if they please, and feel in taking it that they have taken their full fee. The tooth-carpenter and the professional dentist are not in the same category.

Dr. Shepard: A large part of the gentleman's speech has been taken up with an oration on philology, being nothing but a

quibble upon the phraseology of the first resolution. I should suppose that any person of intelligence and cultivation, who had mingled much among men, would understand that the phrase "a good English education" was but another term for what is otherwise expressed as a common-school education. The idea of objecting on that ground is but a quibble and not an argument against the resolution, and I was very sorry to hear him announce that he was going to move to lay the resolution upon the table. The proper thing to do, it seems to me, is to suggest an amendment rather than to put it where it cannot be discussed any more. I will not say that it cannot be improved, but ordinary minds would understand it as a good common-school education, such as is possessed by any graduate of a high school, or by any graduate of a German gymnasium, whether he understands the English language or not. A large part of the discussion upon these resolutions seems to me to have been taken up by fault-finding and grumbling against the present condition of things. There are always plenty of grumblers who are not satisfied with things as they are. We are all of us in that chronic condition. The section which reported this resolution is in that condition, and is trying to suggest a remedy. There has been almost nothing said, directly, upon the question of the adoption or rejection of the resolutions. I am in favor of the adoption of these resolutions. They do not come up to my views. They are very far behind what I would like to see adopted. I grumbled a great deal at these resolutions in the section, but they have been reported by the section as a compromise. Members of the section made their little speeches in the section in regard to the resolutions, and as the result of those speeches the compromise was adopted, and they united in the compromise, but now they come here and make similar speeches in opposition. Are the resolutions an advance? That is the first question. The second question is, are they as far in advance as the Association is prepared to adopt? Those are the only two questions. If they are in advance they should be adopted. If they are not as far in advance as the Association is ready to vote, then amend them and put them a peg higher. It can be done in several ways. One way is to amend the second resolution by putting the date back to the first of July, 1870, instead of the first of July, 1875, cutting out the men who have entered the profession during the years

between 1870 and 1875 from participation in the one-term course. If I may speak of the action of the section, the original motion in the section was to make it 1870, but the compromise of 1875 was carried, which opened the door still wider. I wish the Association were ready to vote 1870 instead of 1875, for it is a step higher. If 1875 is too high for the Association to vote, it can be made '76, or '77, or '78, and so admit a still larger number of this great mass throughout the land who have no degree. I am on record since 1872, in this Association, as will be found in the transactions, in opposition to the granting of degrees by the colleges upon one course of lectures, but I have been willing that certain colleges should do that if they pleased, so as to keep the doors open wide for those worthy practitioners who had failed to avail themselves of the privilege, but I think a great mistake will be made by the Association at this day, when these doors have been open for thirty years, if it does not take the stand that our colleges are not merely institutions for the graduating of men, giving them their diplomas simply to entitle them to a legal doctorate, but are for the great purpose of educating young men and bringing them forward in a legitimate, correct and proper manner to enter the profession through their doors. That time, I think, has come, and the Association should take the stand now that they should look to the young men—the newcomers into the profession—and leave those where they are who have neglected the advantages previously offered. The first resolution covers the subject of a proper preliminary education. The second resolution covers the point of one course of lectures, and I hope to see it adopted. The third resolution does all that this Association can do as a body corporate, which is to exclude from membership those colleges which do not adopt the course prescribed. I would go still further than that, individually, and claim for this Association power to legislate more strongly and bindingly on the colleges; but we cannot go as far as some of us would wish. I hope, therefore, to see these resolutions adopted, substantially, as they are, or amended to make them stronger.

Dr. Hunt: We are all engaged in one common object, and that is, the advancement and improvement of our profession. We only differ as to the means necessary to attain that object. It was remarked in the report, very happily and properly, that the subject

of dental education was not by any means exhausted. We are in a progressive state, and it is our duty to do the best we can under the circumstances. It has been said that the shorter term of pupilage has been offered by some colleges as an inducement to those who wished to enter the profession of dentistry, to come to those institutions and get their diplomas in a short and easy way. The college with which I am connected offered what they call that inducement. It took the ground that the standard for granting a diploma should be merit alone, qualification and proficiency in all the branches which are necessary in the practice of dentistry, and not the length of time which was consumed in study. At the same time the college placed the standard as high as they dared to, which was as high as that of any other college in the country; and that is the correct principle—one which has been adopted by the Johns Hopkins University of Maryland, which has at its command all the money that is necessary to carry out any system. It was adopted after careful deliberation upon the best information that could be obtained concerning educational systems. We had an examining board for the college I refer to. I am very glad that Dr. Stellwagen put forward his argument intended to demolish the position taken, of the advisability of an examination by others than the faculty, because his argument is demolished by the statement I am about to make. The board of regents, which is the examining board I refer to, examine only those who have passed the faculty, and received their approval; and if the board does anything, it is to turn back, as it has the power, those who have been examined by the faculty, if the latter has made a mistake. With regard to the preliminary examination referred to in the first resolution, I heartily agree with the position assumed of the absolute necessity of a preliminary examination by the faculty of a college, who shall have the privilege of saying what material shall come into their hands for dental instruction. If a man cannot write a good grammatical letter, if he does not understand the English language sufficiently for that, he certainly is not qualified to learn a profession, whether dentistry, medicine, law or theology. This cutting down of the course to one term is intended to meet those cases that the section thought required to be made an exception of. The time will come when all those who are now practicing dentistry will have either gone to their long home, or have entered the pro-

fession through the door of a college. When that time comes, we cannot say that the matriculant can graduate in one year, but at this time the necessity exists, which the section recognized, of making exceptions to that rule. With reference to the multiplication of colleges, I will only say that the section takes the ground that a college should be established where a college is proper and necessary, and not otherwise. We in Maryland and the District of Columbia have concluded that two colleges are too many for that locality, and so have consolidated them, and in the consolidation our faculties have been united.

One more point I wish to touch, and that is, that the whole tone of the report takes one position which the resolution does not. The tone of the report claims the right to prescribe what colleges shall do. I agree that there should be a single association in this country which should have the legitimate, conceded and delegated right to control colleges as to their general standing, and as to their standard of education. We have not, at this time, that right. I cannot vote for the second and third resolutions; though conceding the right of this Association to make the claims set up in them, I do not think it has the delegated authority to support or justify those claims. The first I shall vote for.

Dr. Peirce: I wish to refer to the difficulties in the way of adopting any common standard of qualifications. Some time since I attended a meeting of the representatives of forty of the medical schools of the country, called for the special purpose of adopting such a standard. After two days spent in discussing the subject and perfecting resolutions embodying the ideas of the representatives, the vote on their final adoption was taken, and the resolutions were lost, the representative of one of the leading colleges stating that their work could not be binding on the schools, but would be merely advisory.

I shall second every effort of this Association to urge upon every school to take that step, and advise a preliminary examination, establishing some standard which every student must attain before he can come into the college; but we shall probably have the same difficulty in establishing this course that the medical fraternity have had.

Dr. Spalding: I was aware of the results of these deliberations, but I hold that we are not to be guided in our course by any

examples that may be set by the medical profession. We are an independent profession, in my opinion, and we must mark out our own course, and decide what we shall do for ourselves. In the estimation of medical men undoubtedly they thought the prosperity of their colleges would be affected by such restrictive action. Perhaps that may be the same case with us. Suppose it is. What of that? The question we are to consider is, whether it will aid the profession. I think no one can question that the future of our profession will be advanced by enforcing this requirement. Therefore I am in favor of it, having acted upon that plan ever since the college I am now connected with has been established. I am satisfied with its operation, having rejected a number of applicants for the reason they had not the proper preliminary qualifications. We know exactly how it works, and we know it works well in the main. You may lose now and then an applicant, but you will soon establish for yourselves a reputation. I am earnestly in favor of that provision and hope it will be unanimously adopted.

Dr. Rehwinkle: It seems to me that with the present light we have on the subject of education, we ought not to have any great difficulty in coming to an intelligent conclusion in regard to these resolutions. We now have arrived at the time when we must do either one of two things, we must adopt these resolutions in such a way as will give an earnest evidence to the students, as well as to the public, that the colleges mean precisely what they claim in their announcements; or else we must acknowledge that the whole thing is mere buncombe. Now if there is any dental association called upon to sustain the colleges, I won't say prescribe for the colleges, but to sustain them in their earnest efforts to do their best, it is, I think, this association. In regard to preliminary examination, I differ from my friend Stellwagen in his blind criticism upon the phraseology of the first resolution. I understood at once that it meant a common-school education, such as the laws of this country provide for all citizens.

Our desire is to secure a better professional education for practicing dentists, and, also, to convince the public that our dental colleges send out educated men. If we ignore the preliminary common-school education, illiterate men, though they may often acquire great skill as manipulators, may yet, for the want of this education, which all professional men are presumed to possess,

often bring disgrace upon the profession as well as upon the dental college which graduated them. I cannot see that there should be any objection to this resolution. It seems to me every one should agree with it, and that it should be made as binding as possible.

In regard to granting diplomas regardless of study, there is something to be said on both sides. In the abstract that principle might be correct, but we must bear in mind that a college faculty is not a board of examiners, placed in power by the state, or by any other authority, simply to pass judgment upon certain qualifications of the candidate. When a college issues a diploma it conveys a certain degree of honor and distinction with it. The diploma carries with it the whole moral force of the institution that issues it, and, therefore, I think a dental college ought to insist upon students passing sufficient time within its own walls to acquire the proper knowledge through its own professors and by its own peculiar manner of teaching, before granting diplomas to them. If the principle referred to is to be adopted at all, it seems to me that as far as it would be proper to carry it would be for colleges to simply grant a certificate of qualification, without conferring any title.

As the colleges only are entitled and privileged to confer degrees, we certainly ought to require of them that they shall insist upon an education within themselves. I agree with Dr. Stellwagen, that a thorough knowledge of a student's acquirements can not be learned from an examination, unless it is extended over a considerable length of time. College faculties, as well as examining boards, very soon fall into a routine way of examination, and many succeed in passing when really the faculty or the board which examines them are not properly enlightened as to their real qualifications. Allusion has been made by Dr. Bogue to the low estimation in which our colleges are held in Europe. During the summer, I learned from a gentleman from London, a graduate of a reputable dental college in Philadelphia, and a man of note, that upon presenting his diploma to the Registrar he was told that they did not recognize it, nor any diplomas from this country except those issued from universities. Another reason for the disrepute of our colleges abroad may be found in the fact that there is a person whose name is John Buchanan, claiming the title of M.D., whose advertisement I find in the British Review, which I hold in my hand, of the "American University Dental College," Philadelphia. When we bear in mind that this bogus institution is

perhaps better known in England than it is in America as a miserable fraud from beginning to end, and when we bear in mind that this advertisement has been published month after month in such a respectable journal as the Monthly Review, and that many of these fraudulent diplomas have been sold throughout Europe, it ought not to seem strange that they do not think much of the title D.D.S. I have the evidence in my hands showing that diplomas have been granted to parties who have never been inside of the doors of this institution, and who could give no evidence of adequate knowledge and acquirements in dentistry, if, indeed, they had any. This proceeding has been going on from year to year, to the disgust of qualified English dentists, and hence it ought not to appear strange to us that the title of D.D.S. is not highly esteemed by the profession in England or Germany, where a great many of these diplomas are bought. There has been considerable discussion in Germany in regard to the character and merits of our dental institutions, one party contending that the fraudulent institution which is advertised in foreign countries only, and which hardly one in a thousand ever heard of in this, is equally as respectable as the other dental colleges in Philadelphia, colleges of high respectability and which are recognized as such by the profession in this country.

A certain Mr. Chapison, of Berlin, has published a little pamphlet, entitled, "Anti-Petermann," wherein he strongly upholds and endeavors to prove the respectability of the above-named bogus institution, and others of like character; whereas, on the other hand, he cannot say enough to belittle and defame the Pennsylvania and Philadelphia Dental Colleges. He represents the fraudulent institutions of John Buchanan as great "State Universities," and the highly respectable dental colleges as mere private and obscure "tooth-breaker shops." These statements, although preposterous and absurd, are, nevertheless, believed by some and upheld by others, who are the victims of Buchanan's frauds, and possessors of diplomas of universities of fraud.

As the title of this pamphlet indicates, it is a personal attack upon Dr. Adolf Petermann, of Frankfort-on-the-Main, who has, through his dental almanac, exposed the doings of John Buchanan, and put a check to the traffic in bogus doctor diplomas of so-called American universities. He has upheld and ever stands ready to defend the character and integrity of our dental colleges.

REPORT OF SECTION THREE

ON

DENTAL LITERATURE.

By J. TAFT.

THE literature of the world is one of its most potent instrumentalities. No important department or branch of human occupation can afford to ignore this agency. The arts and sciences, the professions, the trades, agriculture, and even occupations of the more menial sort, have each their appropriate literature, upon which they largely depend for development, growth and strength.

Literature is made to serve a great variety of purposes and causes; too often the objectionable and pernicious, as well as the commendable and the good. Literature is a written record of the things, the acts, experiences, opinions, suggestions and thoughts of those who have been, and now are, upon the stage. Dentistry had not a name or a place among the professions, nor in the world, till a literature began to develop for it a record of its accomplishments and capabilities, its modes and aims. In the records of the past much is found of interest, instruction and encouragement; in these is seen the way of progress and the manner in which present attainments have been made.

It is impossible to estimate with any precision the influence of the literature of our profession from the beginning to the present. That it has been great no one will venture to question; indeed the present status of dentistry is in a great measure due to it. In verification of this, a hasty glance at the past may not be amiss.

During the 17th century but little was written upon the subject of dentistry, only a few crude efforts were made, indeed nothing that looked toward or indicated the establishment of a professional or even a special occupation.

During the 18th century the importance and value of the teeth began to be more fully realized; why this was so, I will not now stop to inquire, but will leave it with the remark that this century was characterized by a spirit of inquiry, investigation and discovery, that hitherto had been unknown.

Concurrent with this growing interest and inquiry, was the production and issue of a considerable number of works upon the teeth and kindred subjects. Most of these were of English and French origin. Of twenty works written prior to the year 1800, eight were produced in Great Britain, nearly all in London; and eleven in France, chiefly in Paris; and one in Vienna.

Those in England embraced such names as Jos. Hurlock, in 1742; Robt. Wooffendale, in 1783; John Hunter, Thos. Berdmore, in 1770; Mayer Lewis, in 1772. Those of France, M. Jourdain, P. Fouchard, M. Barron, M. Gerauldy, in 1737.

This by no means exhausts the list of writers upon the teeth during the 18th century, but it is quite sufficient to show that there was a growing interest upon the subject. During the 17th century there was very little written upon the teeth, and doubtless the interest in, and knowledge of, the subject was at a correspondingly low ebb.

Prior to the present century nothing of any note was written in this country upon the teeth, or anything pertaining to them. During the first forty years of this period works multiplied rapidly; nearly all of these were written and published in London and Paris.

The first treatise upon dentistry in the United States was by Dr. Samuel Sheldon Fitch. His observations upon the importance of the teeth was published in 1828, and his system of Dental Surgery in 1829. Other productions soon followed. The writings of Drs. Eleazer Parmley, Solyman Brown, Horace H. Hayden, Harvy Burdell, S. P. Hullihen and Chapin A. Harris, are familiar to all students in our profession.

The influence and results of the growing literature of our profession during this period are worthy of consideration. The first mention of the existence of associated effort is made in the first volume of the American Journal of Dental Science (p. 17), in 1839, in which is mentioned the Dental Association of Western New York, and the Society of Surgeon Dentists of the City of New York.

During the year 1840 the American Society of Dental Surgeons was organized, and was an agent of great good for about fifteen years. Subsequently other societies were formed. The number continued to increase, until now there are in active operation in this country about one hundred dental associations. The good accomplished for the profession and for mankind by this kind of effort is beyond estimation.

That this work has been supported, strengthened and made efficient by the literature of the profession, is plain to the casual observer. Can any one imagine extensive and efficient coöperative effort, without such a medium of communication as the written word affords?

In 1839 the first periodical devoted to dental art and science was established, and has continued its issue to the present time. "The American Journal of Dental Science," the pioneer, has exercised an immense influence in molding the profession since the beginning of our periodical literature. Many others have found place and favor, viz: "The New York Dental Recorder," 1846; "The Dental Register of the West," 1847; "The Dental News Letter," 1847; "The Dental Cosmos," substituted for the "News Letter" in 1859; "The Dental Times," in 1863; "The Missouri Dental Journal," in 1869; "The Dental Miscellany," in 1874. Quite a number of others of less note and pretension have appeared from time to time; some of them are still living, and each accomplishing good.

As the formation of a dental association was in the mind and heart of Dr. H. H. Hayden, for several years before fruition, so in the mind of Dr. Chapin A. Harris, the idea of a dental college was, for a few years at least, maturing. The thought passed from him to others, and in 1839 the Baltimore College of Dental Surgery, the first in the world, was organized, and in 1840 its first session was held. Five years afterward the Ohio College of Dental Surgery was organized and entered upon a career which has been creditable to its founders.

In the succeeding years other colleges were founded, and at the present time there are in this country fourteen in active operation, each doing good work for the profession and mankind.

The very existence of the three grand agencies just enumerated is based upon and sustained by our literature. Without it, how

feeble an agency would our associations be? What would have been the success of our colleges without a textual literature? That the written productions of our profession have been free from error and palpable defects, none will venture to claim; indeed, it may be said that they all bear the stamp of imperfection. But let not a severe judgment be passed till due consideration is exercised.

In the earlier periods of our profession, very circumscribed and imperfect views were entertained upon almost all the subjects connected with either its principles or practice, and between these and that which was written upon them, there would, of necessity, be a correspondence.

But rapid development, change and growth have in a marked degree characterized the dental profession throughout its history, and this involved constant variation in what was said and written about it. So great and rapid have been the vicissitudes, that the descriptions, declarations and instructions that have been announced — and correctly too — at one period have within a few months, or years at most, become obsolete; but we are not therefore to infer from this that they are of no value.

The strength we derive from the bread we eat to-day will be expended by to-morrow, and is then gone forever. Was it therefore of no value? Our literature of the past should be valued for that which it has accomplished.

Again, in the earlier periods of the profession far less importance was attached to the writings of our specialty than there is to-day, and so much less was attempted. A retrospective view of the literature of our profession, of the influence exercised by it, must carry with it the conviction that it has been one of the chief agencies of its development, growth and support.

If these things are true, we should value the literature of our profession. That it should be improved all will admit; far more care should be exercised in this direction in the future than has been in the past, and especially is this true of the periodical matter. This may with truth be said, however, that our periodicals compare favorably with the publications issued by the medical profession.

The past year has added something to our textual writings. The following are worthy of notice:

The Antiseptic Treatment of Diseases of Tooth Pulp, with a

presentation of the principles of secondary formation in the pulp. By ADOLPH WITZEL. With eighteen litho- and chromo-lithographic plates, and seventy wood-cut illustrations.

The following subjects are presented and fully discussed, viz:

1. On the action of arsenical paste.
2. Capping exposed pulps.
3. Amputation of partially inflamed pulp crowns.
4. New formations in the pulp.
5. Causes and consequences of dentine new-formations in the pulp.
6. Total inflammation of the pulp.
7. Filling root canals.
8. Treatment of failures.
9. Final remarks and observations.

The author discusses these subjects freely. He starts out by giving the treatment of inflamed pulps. The first section gives the treatment by the use of arsenic: he advocates its use. After adverting to the theories that have been advanced in regard to its action, he gives his own practice, and the reasons for it. Some of these views are somewhat at variance with our observation; for instance, he says that arsenic applied to a healthy pulp, which has not been wounded, acts only superficially, and applied on a partially inflamed pulp devitalizes only the diseased or inflamed part, whilst the healthy parts of the pulp in the crown and roots will not be destroyed.

In all cases, just previous to the application of the arsenious paste, he applies a mixture of dilute carbolic acid and tannin for a few moments, and immediately upon the removal of this applies the arsenic. The effect of the tannin and carbolic acid is to anesthetize the pulp, and lessen the pain occasioned by the application of the arsenic. It also lessens the pain of amputation.

He mentions that there is no change in the tissues that do not come in direct contact with the arsenic. Any change outside of this contact is due to the preëxisting pulp inflammation.

He presents very beautiful illustrations of pulps magnified ten diameters to prove his position.

In cases where the results are not such as he has given, it is because of failure in the proper application of the agent, or the treatment has been defective at some point.

He suggests the addition of a small portion of morphine to the arsenic paste.

For capping he gives nothing new. He mentions that in every instance in which a wounded pulp is covered with oxychloride of zinc in contact, it mummifies.

When a layer of softened dentine covers the pulp he applies the tannin solution, then removes it in all cases, exposing the pulp, then treats as before indicated.

The diagnosis for an irritated pulp is made by a jet of cold water upon the dentine nearest the pulp, which will pain but a moment when the pulp is but slightly irritated, but it will give pain for a longer period when the organ is partially inflamed.

He advocates the removal of a diseased portion of pulp, and the preservation of the remainder. He gives cases, wood-cuts and plates, illustrating his views and practice. He says: "Previous to the year 1874 I had one hundred and eighty-three cases, treated after this method, and annually since that time from eighty to one hundred cases, so that to-day I have statistics of almost six hundred operations."

Following this subject, he considers quite fully calcified formations in the pulps. He says: "I find these denticles in over twenty per cent of decayed teeth, varying in number from three to more than forty in a single pulp. These are found in every part, but especially in the center, of the pulp crown; they vary in form, are spherical, oval, cylindrical and spindle shape, with wart-like surfaces. They vary in size from those scarcely visible to the naked eye to those almost the size of the pulp-chamber. In color, the smaller ones are white, with some luster; the larger are often amber color, in which the dentinal tubes are plainly visible.

"The smallest denticles have been described as mere calcifications, but we will show farther on that they are dentinal new-formations. The free denticles are not in contact with the walls, but are inclosed in pulp tissue." If the denticles are fused together they are called multiples, but if they unite to the tooth-bone they are called adherents.

"The causes of the production of these denticles have not been sufficiently investigated: such investigations meet with the same difficulties that attach to the examination of developing organs and parts.

"It is not possible to follow these processes step by step with the microscope. The development of a new-formation has a local cause, and predisposition of the tissues to secondary formations."

He discusses fully the formation of denticles in teeth not decayed and comparatively free from outside excitation; then takes up the formation of these bodies in teeth that are decayed and diseased.

Of wholly inflamed pulp, he says: "When a pulp is quite exposed and totally inflamed, its preservation is rarely possible, and it is usually attended by severe and somewhat extensive pain."

The causes of pulp inflammation, he indicates, are those with which we are generally familiar.

The illustrations, by wood-cuts and chromo-lithographs, are diagrammatic, but serve well to illustrate the points in question. Mr. Witzel has certainly given much close study and investigation to the subject. Upon the pathology and treatment of the dental pulp, it is superior to anything to which our attention has been called, and it is very desirable that it should be rendered in English at an early date.

A Practical Treatise on the various kinds of Artificial Dentures; comprising, also, useful Formula Tables and Receipts for gold-plate, clasps, solders, etc. By Mr. Chas. Hunter, of London.

This volume contains two hundred and sixty-eight pages, and is well illustrated. It is an excellent elementary work for the student, and a good hand-book for the practitioner as well.

The author takes up modes, processes and materials, and presents and discusses every subject pertaining to each in a very clear and concise manner, and yet briefly. Some methods and processes are introduced and described that are not employed in this country; from this, however, let it not be inferred that they are not valuable.

There is very little, if anything, in this work that is not of practical value. The work ought to be in the hands of every one who is in anywise engaged or interested in dental prosthesis.

Since the last meeting of this body, the second edition of the "Elements of Dental Materia Medica and Therapeutics, with Pharmacopœia," by Mr. James Stocken, has made its appearance. In the preface to this edition the author remarks:

"Anticipating the results of the noble efforts being made to

raise the intellectual status of the Dental Profession, and in view of the probability that at no distant date Materia Medica might form part of the curriculum of the dental student, I have decided to enlarge its scope; the result of that decision has been the addition of considerable fresh matter, and the volume, as now published, is double the size of its predecessor. Many corrections and improvements have been made in this edition, which make it far more valuable than the first."

The advance of the profession will doubtless ere long render necessary a more complete special work than this; and in the preparation of the next edition of this work, or in the preparation of another work upon the same general subject, it will be well for the author to bear in mind that Materia Medica already forms a part of the curriculum of the dental student. There is no special work on this subject that fully supplies his requirements, and to meet these, such works as Wood, Stillé, Waring, Biddle and Headland should be studied.

A Manual of Dental Surgery. By ROBT. BAUME, Dentist, of Berlin, editor of the Vierteljahrsschrift. With 122 illustrations.

The work is divided into ten sections, embracing the following subjects:

1. Anatomy.
2. Anomalies of the Teeth.
3 Diseases of Dentine, Enamel and Cementum.
4. Diseases of the Tooth Pulp.
5. Diseases of the Periosteum.
6. Diseases of the Jaws.
7. Diseases of the Gums and adjacent parts.
8. Neurosis.
9. Extraction.
10. Prosthesis.

The author had his attention more especially drawn to the preparation of this treatise by the offer of a prize, by the Central Association of German Dentists, for an essay on the question "What influence have the diseases of the teeth on the whole organism?" He says: "At first I had the intention to attempt the preparation of a work on this subject. I formed a design for it and gathered material, which is abundantly distributed through dental literature. To master the material, a monograph would have been necessary."

Dr. Baume, after considering the whole matter, concluded that a text-book of dentistry in general would meet the question more nearly, and be of greater general utility than a mere monograph.

The first and second sections present a very good résumé of what has been known and written upon the subjects hitherto. In section three he takes the ground that vitiated secretions of the mouth is a fruitful cause of dental decay. The hard parts of the teeth are destroyed by acids, alkalies and mechanical abrasion. In section four, on the diseases of pulps and their treatment, he gives a very good presentation, though to the close and observing reader there will be but little, if anything, especially new.

He takes issue with Dr. Witzel on the use of arsenic in the treatment of diseased pulps. He contends that it cannot be applied to any exposed pulp with an assurance that the entire organ will not become devitalized, and that generally after the use of the arsenic, reactive inflammation extends to the periosteum, though he makes no mention, and may not be aware of the prior treatment, by the solution of tannin and phenol, which seems to be an important element in Mr. Witzel's treatment.

In the excision of pulps, and the preservation of the remaining portion, he seems to have very little faith, regarding it as an impracticable mode of treatment for the general practitioner.

The question will naturally occur: If this treatment is practicable and successful at the hands of Mr. Witzel, may it not be with others? If the latter has clearly attained the results he claims, it teaches an important lesson, the value of which ought not to be disregarded.

Diseases and treatment of the periosteum are fully treated, and the views generally are correct.

The sixth section, on diseases of the jaws, occupies about one hundred pages: the principles pertaining to these affections are clearly and tersely set forth. This may properly be said of all the remaining sections.

Dr. Baume takes high ground in reference to both the science and art of dentistry. It has come to that point when it may properly be regarded as a specialty of medicine.

The details of operative and mechanical dentistry are not as fully given in this as in some other works. The work, as a whole, is valuable, and we trust an edition in English will appear at an early day.

"*The Origin and Formation of the Dental Follicle.*" A histological treatise, embracing the evolution of the teeth and associate parts. By Drs. LEGROS and MAGITOT. Published by Jansen, McClurg & Co., Chicago.

To this work your attention was briefly directed in the report on literature of last year. At that time it was only in the French language. It has since been translated into English by our worthy and highly esteemed fellow member, Dr. M. S. Dean. This is an exhaustive treatise upon this subject.

The tissues from which the teeth originate, and the progressive stages of development, are minutely described and amply illustrated, from their incipiency to the completion of the dental follicle. This covers the ground that had been only partly explored by previous investigators. These authors have here undertaken the most difficult task that the embryologist has to deal with, in connection with the development of the teeth. In addition to the human embryo, their investigations have been made upon large numbers of those of the different species of domestic animals.

The authors begin their descriptions with the elements that constitute the external structure of the mucous membrane, and at an epoch anterior to the full development of the subjacent tissues; thence tracing their history, step by step, in the formation of the enamel-organ down to the period at which the dentine-papilla makes its appearance. They then describe the progressive stages of these and the surrounding tissues, both separately and as a whole. In this way they give to the reader a very complete idea of the character and mode of development of the histological elements that enter into the constitution of the teeth. In all the morphological changes that take place in these cells, and the different physiological functions they are called upon to perform, the *primitive origin and character* of these elements are always kept prominently in view. The physiology of these parts is considered in connection with their histology and with the same thoroughness of research and minuteness of detail.

While many authors have described the process of development of the hard tissues,— the enamel and dentine,— the stages of evolution prior to the formation of these have been left in comparative obscurity; the origin and development of the enamel-organ, the dentine-papilla, and the adjacent parts, having been passed over

lightly, and without giving a definite idea of their embryonal phenomena. From this treatise, therefore, we get a clearer insight into these occult processes of evolution, than from any other work.

The Translator's Introduction occupies about forty pages, and treats of the mucous membrane, the growth and decline of Meckel's cartilage, the inter-maxillary bones, etc.

The description of the mucous membrane and the terminology used are very much simplified; and with the aid of the diagrams and cuts, the elements from which the enamel-organ originates may be easily understood. The writer gives a clearer and more intelligible idea of the position of the layers of the mucous membrane and their elements, especially those from which the enamel and dentine are derived, than has hitherto been presented. This description was not necessary for such as are familiar with the minute anatomy of these parts, as those were supposed to be for whom the work was originally written; to many, however, who have not gone over the ground thoroughly, it will be found a valuable aid in clearly comprehending the subsequent treatise.

The article on Meckel's cartilage is exceedingly interesting and instructive. A description of this organ is given from its first appearance as a temporary support to the lower jaw till it finally disappears. This account of a structure very little understood in our country is made additionally clear by cuts drawn from nature by Magitot and Robin, and the translator. It gives a more definite idea of this organ than is elsewhere found in the English language.

The original treatise is amplified by the translator's explanatory notes, in which the views of many of the more eminent authors have been introduced; generally favoring, but sometimes dissenting from, the views advanced in the text. From these the reader will gain considerable knowledge of the recent literature upon many difficult and disputed points in the evolution of the teeth, which he would otherwise find it difficult to obtain. This we consider an important feature of the book.

"Although the work may not be considered as a 'practical treatise' in the ordinary acceptation of the term, yet it contains valuable lessons, which may be applied in preventing the disastrous consequences of those exanthematous diseases which are so liable to arrest or pervert the nutritive supply to these develop-

ing organs, and which often result in the disfigurement, and sometimes in the entire loss of the teeth. Hence, its suggestions should not be confined to the dental surgeon alone, but should be made available by the medical practitioner, who, at the present day, retain almost undisputed possession of this sadly neglected field of practice."

The book is illustrated not only from the very superior cuts copied from the original (which represent to the eye the various stages of development more fully than any preceding work), but also by several that have been added by the translator, of which some are drawn from nature and some are selected from the works of recent authors.

The translator has achieved the difficult task of giving the exact sense of the authors, so far as we have been able to discover, and at the same time of presenting their ideas in language entirely free from the harsh and inelegant style so common in translations of scientific works. For this, and for the entire undertaking, he is entitled to the thanks of all who desire to see the profession of dentistry resting upon a scientific foundation and legitimately entitled to rank among the learned professions; and if the work is properly appreciated, it will soon be found in the hands of every dental practitioner and student in the land.

In the future let the literature of our profession give evidence of development, growth and progress, equal to that which is so palpable in almost everything else that goes to make up our profession.

DISCUSSIONS.

Dr. Bödecker: I would like to say a few words with reference to the work of Dr. Witzel, which was referred to in the report. I have read it very carefully, and think it contains many mistakes. In reference to treatment with arsenic, the author says the action of arsenic in a healthy pulp is altogether a superficial one. I think he could not have seen the effects of the action thoroughly, because the way in which he prepares his microscopical specimens is rather a queer one. He takes out the pulp, lays it upon a slide with glycerine and then puts the cover on. It is all right to examine such a preparation with a power of ten or fifteen diameters, as he does; but he will only be able to see the outer surface of such

specimens. The minute changes that have occurred by the action of the arsenic within the pulp cannot be seen by this examination. Therefore, I think some of his statements are rather hypothetical. He says that no pulp has ever been saved by an oxychloride capping. A relation of mine wears a canine tooth which I filled about seven years ago, and used oxychloride for capping the pulp. Two or three years later I removed the filling and found the pulp healthy, though not covered with a new deposit of secondary dentine. I capped the pulp the second time with creosote and oxide of zinc, and filled the cavity with oxychloride. A year or so after I saw the tooth again, and the pulp was still alive and in very good condition, but not covered by secondary dentine yet. I think this proves that one pulp, at least, has been saved in that way. I have seen many others that Dr. Atkinson has saved in the same way. Dr. Witzel claims that he has a method of capping with diluted carbolic acid and oxide of zinc, evidently thinking the Americans never have used anything but oxychloride to cap pulps with, and that this method is quite a new idea, originating with him. Every one in this country knows that pulps have been successfully treated in a variety of ways. Five or six years ago Dr. Atkinson showed me many different methods of capping pulps. The drawings in this work are executed as beautifully as any drawings or litho-photographs can be. They have been made by the celebrated Dr. Joseph Heitzman, of Vienna, a brother of the renowned Carl Heitzman, of New York. These drawings show one or two arteries in every pulp, which, in the upper portion of the latter, ramify like the branches of a tree. I have examined a number of pulps, but I have not been able to see one such artery. I will not say that there may not be arteries within the pulp, because I have not seen them, as in making a section of a pulp I might have lost just that portion of it which contained the arteries. I hope soon to have time to experiment a little more with arsenic, as well as pulps.

Dr. Spalding: What is the character of the blood vessels that convey the blood within the tissues of the pulp?

Dr. Bödecker: Capillaries.

Dr. Spalding: No veins in them?

Dr. Bödecker: I could not distinguish any. I have never been able to find the least trace of muscular fiber within any of

the vessels of the pulp, but I do not say that there are none, because I have not studied them closely enough to be able to make a positive statement. I have had a microtome made for the purpose of cutting pulps, so that I shall be able to get every section. In this way I can save the entire pulp without losing even the smallest part, and then I shall be able to say whether there is an artery in the pulp or not.

Dr. WERNER: If there were no arteries in the pulp, how could we have palpitation of the pulp?—which I have seen three times, to my recollection, as distinctly as pulsation can be felt at the wrist. I have always taken it for granted, and do now, that it is absolutely necessary that there should be large arteries in the pulp.

Dr. BOGUE: Our friend, Dr. Atkinson, squelched the entire First District Society in New York lately by speaking of "that exploded system," or "that exploded idea of arteries in the tooth pulp." I confess I felt myself extremely ignorant, having always supposed there were such, and I was told by six or seven others that they were in the same condition. I would like to ask those who have investigated this subject to inform us whether the term artery is to be applied to a vessel having three coats, or whether we may apply it to one with two, or possibly with one? I have not been able to get any definition of the word artery, as used in this connection, although I have asked two of these gentlemen in private. I, too, have seen the pulsations just spoken of, and Salter goes one step further and states that he has seen striated muscular fiber in the dental pulp, which I understand is the difference between what Dr. Atkinson would call an artery and what he would call a capillary. I am so much in the dark, and having sought in vain for light in the books, I venture to ask the gentleman to give us light here? If Mr. Salter *has* seen muscular fiber in the dental pulp, the fact that Dr. Bödecker has *not* seen it in a rather extended examination of pulps does not explode the idea.

Dr. BÖDECKER: My discrimination between an artery and a capillary is, that the former contains a distinctly visible muscular coat — the latter is composed merely of flat endothelia, and I have never seen a vessel in the pulp which had any muscular fiber at all, but I do not say that there might not be one. I have myself seen the pulsation of pulps. The arteries that go in at the apex of the fang sometimes divide, as I have seen them, into a very close capillary network.

Dr. Bogue: I would like to know whether fœtal pulps have ever been examined.

Dr. Bödecker: I have examined some few fœtal pulps, at the base of which you sometimes see an artery and a great abundance of smaller vessels, but in adult pulps I have never seen an artery yet.

Dr. Bogue: It is simply a question of the name to be applied for the continuation of the same vessel.

Dr. Bödecker: It is whether the vessel remains there.

Dr. Bogue: If it enters an artery, as I understand you, it may become, in a very short distance, a capillary, by losing its coating of muscular fibers?

Dr. Bödecker: It loses its character, too.

Dr. Bogue: But still remains a pulsating vessel.

Dr. Bödecker: The capillary cannot pulsate, but the flush from the artery, which is so very near, by the pressure of the blood, may cause pulsation in the pulp.

Dr. Bogue: I have asked so many questions because Dr. Bödecker is decidedly an authority.

Dr. Atkinson: Any embryologist living, that is worthy of the name, will not take the ground that there are the three divisions or classes of vessels in a dental pulp; and any individual who is an anatomist, even cursorily, will be able to see that there are many vessels coming in at the base of the pulp before the alveolus is formed, that continually coalesce in it, by retrograde metamorphosis as the dentine is formed, so that in many instances we may have one, two, three, four or five foramina at the end of the root of a tooth, and not an artery in any one of them. Those large vessels that you see in the pulps are nothing but what we call sinuses, in embryological investigation. If we were to pay sufficient attention to the investigation of nature, we should be better entitled to ask questions, and in a better receptive mood to accept the truth when it is presented. We have just as good instruments in the United States to apply to such investigation, and the very best lenses made in the world, and we should investigate for ourselves and not handicap our minds with the false interpretation that pertains to every book on histology yet published that I have ever seen. I wish to enable you to have in your minds something like a definite formula, whereby you might distinguish between

the three classes of vessels: arteries, veins and capillaries, and to show you that they all begin in larger sinuses that are the predicate of "blood islands." I have seen in the egg of the hen seven or eight blood islands, all beating like hearts, spinning out until they were finally reduced to the normal number of islands that constitute the cavities of the heart, thus originating it. I wished to say that much, so that I might make a remark or two that would fasten upon your minds, and then ask you if you ever saw an artery that was enlarged in size as it goes from the heart, according to the morphology of its original formation — enlarged from any point distant from the heart? Now if that is true, then there is no artery that normally does enlarge so as to be present in the pulp of a tooth; what are you going to do with an artery in the pulp — since there is the small foramen that you have been time and again told by histologists has one or two arteries and two or three veins? If you will bear that in mind, you will perceive that there is no case where the artery enters the end of a pulp, and has the requisite three coats to its caliber.

What would follow extractions, and why do teeth sometimes continuously bleed when you take them out? Plenty of men have seen cases in which they were bothered about stopping the hemorrhage. The reason is there is no artery there; if there had been an artery, and it had been broken, the longitudinal fibers would have contracted sufficiently to have closed up the end of the artery; but being capillary, when extracting the tooth ruptured it, it left a little funnel-shaped, patulous mouth.

I wish to say something about the foreign literature that we are so crazy about, simply because distance lends enchantment to the view; and we would rather take the word of somebody else that sayings are true than to investigate for ourselves. The very nomenclature of Witzel and that other man indicates to me that they are men who have received their degrees by way of accommodation; that they must have bought one of Buchanan's tickets of scholarship along with a sort of addendum that indicates his ignorance, in the way of a diploma.

REPORT OF SECTION THREE

ON

NOMENCLATURE AND TERMINOLOGY.

By W. H. ATKINSON, Chairman.

TO those who have carefully studied last year's report, prefatory remarks are unnecessary; but to those who have not seen it, some little detail may be a means of inviting patient and close attention to a subject which the world has boggled over for all time. My own preconceived preference for things old and accepted by teachers and scientists long stood in the way of my own consideration of a subject which seemed too deep and occult for ready apprehension by even the best efforts of the best minds. After much struggle to adequately express myself to my brethren about things clear to my own apprehension, with but slim acceptance, I have at length become convinced that the only successful method of arriving at a sure foundation for correct pronouncement of our mental labor is to pursue the following studies of basic science growing out of the discovery of universology.

Returning to the point of commencement in these new technicalities, as made in last year's report, further experience suggests one or two slight amendments in the form and use of the terms then employed. In describing the four grand universological varieties of Form: Punctiform, Liniform, Planeform, and Solidiform, it is found that the third of these — Planeform (form made up of planes or surfaces) — does not get the pronunciation which is intended from this mode of spelling. It is apt to be called Planeform, in two syllables, while the spoken word is three syllables, like Liniform and Punctiform. This would be partially remedied by changing the connective vowel e to i, making Planiform; but such is the peculiar kinkiness of English spelling, that this change

would cause another change in the sound of the vowel of the first syllable; and the word would then be pronounced as if its first syllable were the word *plan*. This would cause a false impression, and must be avoided. The true pronunciation is given thus, plane-i-form; but we cannot rely upon such an unusual method as the introduction of two hyphens. Fortunately there is a device which is not so violent as this. The English root word here is habitually spelled in two ways, *plane* and *plain*. This is one and the same word with variant spellings; but, as in the case of proper names, Clark and Clarke, or Smith and Smythe, a prejudice arises in favor of one or the other spelling, as the more aristocratic, so *plane* has obtained a sort of fixed preference, wholly without reason, as the geometric or scientific term, and *plain* is the democratic or ordinary orthography. We shall have, on this occasion, to conquer our prejudices and write the word in question Plainiform, in order to secure the desired pronunciation without resorting to hyphens. This is a fair instance of the infinite difficulties which we suffer from the unphonetic character of English spelling, and which we should escape if the spelling reform were to prevail.

It is not expected that these novel and precise new technicalities will be adopted and made familiar at once by more than the very few who make a specialty of the subject; but, being in existence, and having a philosophy, they may be taken up, one or two at a time, by authors who find themselves in straits to express their ideas more precisely than they are able to do by the use of the old terms, and thus gradually be introduced to the public. The old fountain-head of technicality has been the Greek language; the new fountain-head is the scientific universal language (Alwato) which the universologists are elaborating for this express purpose. A short account of what universology is, and of its methods of forming words, will not, therefore, be inappropriate.

Universology is the one science, embracing in a sense all other sciences, which grows out of the discovery of the fact that one and the same set of laws and principles underlies all the sciences, so that similar distributions are made, first of the universe or world itself into the fields or domains of the special sciences; and, then, of these particular fields, internally. The ground covered by each science is, in other words, amenable to the same general system of the division of its parts as that cov-

ered by any other science, a fact which opens the way to one universal system of scientific technicality. To conceive of this unity in the midst of the utmost diversity let us compare two departments of science so wholly dissimilar as the science of language and physiology (*i.e.*, macro-physiology, including anatomy, physiology, and hygiene). Both of these sciences concur in having a fundamental threefold division into 1. A stationary aspect or department, the investigation of the thing as it now is, or apart from any changes; 2. A transitory or motic aspect or department, the investigation of the changes which it undergoes from time to time, or moment to moment; and 3. A complete or perfect aspect resulting from the combining of the former two, and which makes the *whole*-th, or health aspect or view.

The first of these yields, in respect to language at large, the science of universal grammar or the logic of language, which is permanent or fixed in whatsoever language and at whatsoever stage of lingual development. This is, therefore, the osteology, or more largely, the anatomy of language. The second yields the developmentology and physiology of language, lingual history, etymology, etc., which are specially related to time and eventuation or the on-going in time—the *motic* as contrasted with the *static* aspect of things. Finally language has its diseases ("phonetic decay"—Max Müller, etc.), hence its pathology, and hence its therapeutics or restoration to health, and hence again its hygiene or its means of maintaining itself in health or *whole*-th, or, what is the same thing, in its normal condition.

On the side of macro-physiology it is now obvious that it is the anatomy, physiology and hygiene of living objects which are here so accurately repeated in the apparently unrelated region of the science of language. It is precisely the same in any other sphere. These differences of static, motic and dynamic (this last meaning potency or health condition), and other similar primal conditions of being, apply equally to every department of being, and consequently to every science. It is this fact, and the recent discovery of it, which render possible, and which *found*, the new science of Universology, *the one science which underlies and unites all the other sciences.*

To restate; for, in a matter so important and so new, a little repetition need not be shunned: It is the first of these universal

principles—Statism—which presides over, and is, as it were, concretely reproduced in anatomy; the second of them—Motism—which presides over and is concretely reproduced in physiology; and the third of them—Stata-Motism, Dynamism or *Tug*-f (for *tug*-th), whence *tough*ness, health or *whole*-th — which presides over, and is concretely embodied in, hygiene.

Not only do these three fundamental principles, statism or the spirit of rest, motism or the spirit of movement, and dynamism or the spirit of tug, exertion or effort (power and force), permeate the totality of every sphere of being, and of its appropriate science—language or living beings for instance—but they are all repeated, pivotally and centrally, in that which is pivotal and central within the given sphere. The verb is this pivotal or central object within the sphere of language, and man ("the word" or *verbum* in a mystical sense) is the pivotal or central object within the total sphere of living objects.

Usually it is said that the verb means *to be*, *to do*, or *to suffer*, (this last specification meaning *to be acted upon*, or *to be the recipient of an action*); but this is not quite the inclusive statement. Let us say rather, 1. *To be* (the neuter or static verb); 2. *To do*, to move objectively or toward the object (the active voice), or *to suffer*, movement subjectively or toward the subject (the passive voice) (phases of the motic or active verb); and 3. *To do and suffer*, action and counter-action, co-acting in a mutual reciprocity of strife; the reflective and reciprocal verb (he strikes himself, they strike each other).

* * * * * * * *

In respect to the new technicals recommended in last year's report based on the root *punct*, to denote roundish, point-like, minute objects or concepts, no change is found to be necessary. The following enlarged list is now submitted, along with a series of diagrams, which will be found, it is believed, remarkably adapted to illustrate both the histological evolution and the potency of the new system of technicalities to follow, by its own corresponding evolution, every step in the series:

· PUNCT-IT, a geometric point, an unpronounced atom.

• PUNCT-ID, an atom; the least pronounced portion of matter, as a concept.

PUNCT-IS, a flock of punctits; a group of geometric points; or, by license, of a minuter order of atoms; of lighter or

finer atoms (following the lead of the mathematicians who conceive different orders of the infinite); A MOLECULE (still, like the atom, uncognized by our visual sense).

Punct-iz, a flock of punctids; an aggregation of heavier or coarser atoms; A GRANULE, the first visible body under the lens.

Punctits (pl. punctitses), a pivoted or nucleated flock of thin or light atoms; an unpronounced corpuscle, *ghost-like.*

Punct-idz (pl. punctidzes), a pivoted or nucleated flock of heavy atoms; a pronounced corpuscle, body-like.

Punct-ish, the light filamentous corona surrounding a vacuole or empty space, implying an unrevealed central point.

Punct-izh, the heavy beamy corona, surrounding a vacuole, implying a revealed central atom.

Punct-it-sh, filamentous-radiance-bearing unpronounced atom.

Punct-id-zh, filamentous-radiance-bearing pronounced atom.

Punct-is-sh, is punctis, *plus* filamentous radiancy; molecule, with filamentous corona.

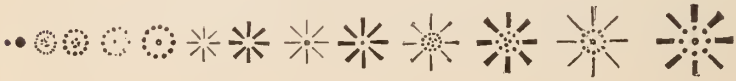
Punct-iz-zh, is punct-iz, *plus* beamy radiancy; granule, with beamy corona.

NOTE.—These two words have for their plurals punct-is-shes and punct-iz-zhes. It is to be observed that Alwato, this new technical language, growing out of universology, provides words which, by their analogy, correspond with obscure or half-occulted objects by similar difficulties in the pronunciation. If, therefore, these two words are unpronounceable, except after phonetic training, so are these histological concepts, which they name, *unpronounced*, except after this close analytical treatment. The plural forms are a little less difficult, as mass-presentments are more *pronounced* than elementary units.

Punct-it-s-sh, filamentous-radiance-bearing corpuscle.

Punct-id-z-zh, beamy-radiance-bearing corpuscle.

COLLECTIVE EXHIBIT OF THE SYMBOLS.



DISCUSSIONS.

Dr. Atkinson: In hopes of arriving at the basis of fundamental activity in spirit and in body the section has labored arduously, and permit me to say successfully, in giving the first postulates that stand in relation to science in general and science in particular ahead of the alphabet of any known language. Their efforts were directed toward getting at *the* foundation and not *a* foundation. Sound is the basis of all verbal communication from one seat of consciousness to another, and is naturally divided (that is, the sound produced by human vocal apparatus,) into thirty-two distinct compartments—that is to say, eight sounds and twenty-four stops. The verb has eight aspects and each one of these aspects has a specificity of meaning in itself natural, and this is the discovery in sound, and the language that presents it is called Alwato and Tekewa.

Following out the lead of this order of phonition, those who have studied short-hand will be better able to comprehend the discriminations made than those who have paid no attention to spelling and pronunciation by other means than simply memories of the repetition of the sound they try to imitate from some other organ or voice. It would be too much of a work to show why there are just eight vowel sounds, and that what have been called consonants have no sound at all. They are simply stops in vocalization that differentiate the stream of sound, so as to differentiate it in specific methods of communication of emotion, or the concept of the mind or feelings. There are twenty-four of these stops that will be nominated in the pursuit of the further projection of the discovery in universology. Now the departure that I would most firmly commend for study is the organization of individual bodies. All naturalists have consented that we must have a starting place, and that starting place has been called an atom, but that was the pronounced atom to be sure. It is a body that is only conceived in the mind, and if you will now follow me I will give you the nomination of these bodies, the representations of which I have on the blackboard.

The first very thin, light point—dot—represents the unpronounced atom, or the *punct-it*, and is represented by this thin, light, indistinct presentment. Then when you take the same body,

enlarged so as to be heavy, that is a *punct-id*, and is represented by this point. A point is position in space, without length, breadth or thickness—that means neither the ghost nor the idea of the point, the movement of mentality, the consciousness that foreshadows the presentment of that which shall be clearly impinged upon the tablet of the mind, so as to have an idea of distinct reality. *Punct-is* is a group of punctits, a group of geometric points. Here we have the lead of mathematicians who conceive different orders of the infinite, and that represents a molecule, an unseen body which is like the atom, uncognized by visual sense. *Punct-iz* is the next order, and is the pronounced molecule. *Punct-iz* is a collection of punctids, an aggregation of heavier or coarser atoms, the first visible body under the lens, not visible to the ordinary visual apparatus, the unpronounced granule or molecule. *Punct-il*, a pivoted or nucleated flock of light atoms, an unpronounced corpuscle—and this is ghostlike. We come then to this next figure, which is simply this one in such form as to be presentable in the more distinct and discernible presence, *punct-idz*, a flock of heavy atoms, a pronounced corpuscle, bodylike. The next is *punct-ish*, the light filamentous corona, surrounding a vacuole or empty space, implying an unrevealed central point. *Punct-izh*, the heavy beaming corona, surrounding a vacuole, implying an unrevealed central atom; that is to say, these two represent the vacuole in its unpronounced and pronounced presence. Then *Punct-itsh*, filamentous, radiance-bearing, unpronounced atom here, the ghostlike presentment or the thin light, with the forms of filamentous radiance about it. The heavy one is *Punct-idzh*, filamentous, radiance-bearing, pronounced atom. This is the ghost and that is the body. The next is *Punct-is-sh*, filamentous radiance. This is the molecule with filamentous corona, with a flock of punctids and with radii about it. The next is *Punct-iz-zh*. These two words have for their plurals punct-itshs and punct-itzhs. *Punct-is-s-sh*, that is, filamentous, radiance-bearing corpuscle; and the next is *Punct-id-z-zh*, beaming, radiance-bearing corpuscle. That is the *amœba* that is the *corpuscle*, sometimes called the embryonal corpuscle, sometimes called medullary corpuscle. Having patiently traversed this whole question, from the standpoint of the text-books, we are driven by the inspiration of our necessities to indicate the universe, or cen-

trality, or consciousness, in seriated movement that signifies mentality, whereby steps are grouped together and coherently packed into: *First*, The ghostlike presentment or ideal from the type, and afterward gather the molecular mass into such divisions or centers as to present us with this, that is acknowledged to be the first form of living body, the *amœba.* I have only a few more words to say, and then will hold myself ready to answer any direct question. I wish to express my great joy at the attention shown last night and this morning to a question so occult, so ghostlike in its presentment, and I prophesy that before ten years shall pass that this body will be acknowledged, by scientists worthy of the name, to be the highest body for the untrammeled presentment of truth. Last year the basis of all this was presented in the report of this section in giving what we challenge the sharpest intellect of the world to contradict: Point, line, surface, solidity, discriminations, that are in nature and patent to every one capable of thinking at all. That was the basis, the four-legged little stool upon which this seven-legged stool was placed. Each one of these has a dual aspect, but there are but seven of the completed bodies, therefore we find that we are all the time dealing with what is called duplicity. If we live we will take the next regular step in the order and add further demonstration of the revelation of truth respecting mental action, scientific coherency, mentality, at our next convocation.

Dr. Spalding: I want to ask Dr. Atkinson one or two questions. One is, whether we are to understand that the first form, punct-it, is a substance?

Dr. Atkinson: Very sharply queried. Everything is a process of emotism and motism. It is substance and it is energy in every instance. Now, what is the concept of matter? It begins with the granule, but we will see that every motion comes out of emotion, and every motion is in some kind of physical body, so-called by the old language; there is no matter without spirit, and there is no spirit without matter.

Dr. Spalding: The last aphorism announced by our friend seems to me a very estimable one. I do not think we have anything directly to do with spirit in our profession. There are material substances out of which the material world is composed, and we are studying the laws of those substances, and there are

spiritual substances out of which the spiritual world is composed, and we do not propose to study the laws of those substances. That there has long been felt a want of some positive system, some plan, grade by grade, and step by step of the whole process of the evolution of material substances by the action of material forces, is most evident. I thank our friend Atkinson, who is working in that direction, that he has started upon a philosophical basis, in appealing to nature for the laws which shall govern the system which he is endeavoring to develop, and he is making very strong headway, too. Everything is produced by the action of two forces. You can make nothing new except by the coöperation of the two forces, male and female principles, and they exist in the Creator just as much as they do in created things. The very fact that the dual relation exists in the Creator accounts for the fact that it exists in created things. So that it is very delightful to my mind to see that this investigation has brought me to a conclusion that there are seven distinct progressive steps in these processes and that each of them has a dual property. I have no doubt that our friend will work out something valuable from these points which have just been made.

Dr. Barrett: This matter of terminology is a subject new to me. If I clearly comprehend the central idea of it, it is that there is an actual and an ideal; that the first central is ideal, the *punct-it* is ideal and the *punct-id* is actual and material, but that the whole matter has anything to do with spiritual force I cannot see. An atom, although it is real, is not demonstrable. We can have no clear conception of what it is without passing into the realm of metaphysics. When we come down to granules we are then in the actual, because a granule is something which can be clearly demonstrated to the visual organ. For the study of physics, as for the study of metaphysics, it is necessary that we have a definite nomenclature; something that is precise and concise, so that when we listen to another, who is speaking on scientific matters, we shall know precisely what is meant.

There is a difference between the concept of the atom and the atom itself, although neither of them can be demonstrated. There is a dual relation; the one is simply the mental image of the thing and the other is the thing itself. In the consideration of these matters we have no fit terms in which to express ourselves. My

present inability to definitely and satisfactorily explain my meaning is because of the lack of the words which this terminology would supply. We cannot definitely speak without using the very terms which Dr. Atkinson suggests, but which are as yet too strange to be at our command. Viewing it in this light we can catch a glimpse of the importance of this immense stride in the direction of a concise, clear nomenclature.

Dr. FRIEDRICHS: I would like to ask one question. We all know that there is a conception of the ideal. We all know that the sun is distant from us about 95,000,000 miles. In connection with this, will the human mind ever be so illuminated as to locate the end of the first mile in the 95,000,000?

Dr. ATKINSON: That is a very intelligent inquiry. Our point of departure is our earth—the inside. The inside and the outside is in every one of us, so that we become, the moment we think at all, the center of the microcosm of the infinite world, of the absolute universe, that is the outlimit. We are to all intents and purposes the center, and then it is from the point at which we stand that we begin our measurement; and how do we arrive at that? We arrive at it by the operation of emotism of our mentality being segregated in consecutive relations of modes of motion, so as to determine certain things that convince us whether we will or not. We cannot believe at will anything at all about it; we have to have the testimony and we do not possess it—it possesses us. How do we get that measure? By the paralax of the stars having been taken and the calculation made. We began with the unit by which we calculate our measure here, and so made out the sun's distance; and they have reduced it from 95,000,000 to between 93,000,000 and 94,000,000 miles. What was the whole country engaged at, and why did all the civilized nations send deputations to take the transit of Venus last year?

Dr. FRIEDRICHS: That does not answer my question. Will the human mind ever be so enlightened as to comprehend it? This is simply an hypothesis of Dr. Atkinson's. In his diagram he gives us a series consisting of seven steps, each step having two divisions. Now, how are we to know that there are only seven steps, with their divisions, in the progression of this ideal point? May there not be 1,400 series instead of fourteen? Other minds have their ideal points, which may deviate a thousand times from his ideal.

Dr. Atkinson: That is precisely what this discovery claims to be,—universality—that is, inclusive science, by which all the other sciences can be clearly demonstrated.

Dr. Friedrichs: I am very glad that the doctor has taken this subject up, and I thank him for the able manner in which he has demonstrated it, even though I do not coincide with him, nor think him correct in his hypotheses.

Dr. Werner: The question is whether this proposed terminology will help us to grasp that which we have not been able to before, the same as the molecular theory enables us to explain certain things which we could not comprehend without it; whether it is a convenient terminology to explain the material from the spiritual. We must necessarily always differ in certain things; the spiritual here is after all of little importance compared with the material. This is a material world, and we have so much in it which challenges our attention, that it seems almost folly to care so very much for the spiritual. When we get to the spiritual world we shall attend to things there.

REPORT OF SECTION FOUR

ON

OPERATIVE DENTISTRY.

By ISAAC J. WETHERBEE, Chairman.

A COMPILATION of the rules and systems of practice of the "ten thousand" (more or less) practitioners of dentistry in the United States would present a condition of things that would awaken the greatest possible surprise, so diverse are the views of dentists as to methods to be employed to obtain a specific end.

If there was *unity* in this *diversity* a satisfactory personal record would ensure a complete justification. In the absence of such record we are forced to the conclusion that there is, at the present time, a dearth of scientific knowledge requisite for a skillful practice of dental surgery—knowledge of the true character and functions of dental tissues obviously required—the proper methods of procedure to conserve, to the fullest extent, their usefulness.

It appears that late events—events characteristic of the age in which we live—have unsettled, or at least disturbed, the convictions of many, which had matured from long and careful observation. Why this sudden change? One might reasonably suppose that a *messenger of light* from a higher plane had at last condescended to give us a "new dispensation."

Let us in a few brief words examine the *salient points* of this "new departure," and see if there is anything really "new" about it, and if so, in what it consists. It is acknowledged by the chief apostle and other expounders of the "new departure" that in *well organized teeth* gold should be employed as a suitable material. In the "Dental Cosmos" for July, on page 376, we have the *true inwardness* of this latter-day adventure set forth with an unction that is exceedingly refreshing. Hear what it says:

"We desire that you should observe *how little, how very little*, we have asked that you should deviate—at first—in practice from that which is usual practice."

"We say, *fill all you can and do*, SATISFACTORILY WITH GOLD! *It is so stated in the bond!* Can you, in turn, ask anything more? Why do you desire to fill such teeth as you cannot fill 'SATISFACTORILY' with gold with that material?"

Is there anything "new about that"?

"But the truth is that the 'true inwardness' of the 'new departure' is a very different thing from this. Its design is to teach a principle which shall indicate lack of knowledge as the cause of '*failure in operations*,' instead of attributing it to defective manipulation."

This audacious assumption! this begging of the whole question, especially after ceding the fundamental principles which underlie dental practice as generally understood, is quite enough to make angels weep, if they have *tears to spare* for the washing away of such folly!

We are *advised* to fill all we can satisfactorily with gold. Why? Because gold makes a good and durable filling in the majority of teeth, notwithstanding the *assumed want of compatibility of gold with dentine.* How shall we determine its compatibility with dentine? Because teeth again decay after having been well filled; and from the same cause or causes which produced the first lesion are we to legitimately infer that the chief factor in this newly recurring disaster is to be charged to want of compatibility? Oh consistency, thou art a jewel!

Again, "it is the *little*, yea, the *very little* deviation that they have asked at *first* from that which is usual practice." Now, why all this? If gold is radically wrong in the *one case* for the want of compatibility, why not in another? And how is it about the *little* departure? Why not away with it at once and make it contraband? The incongruity and fallacy of such teaching is quite enough to indicate a relish for the leeks and onions of Egypt.

The enunciation of the plausible theory of chemico electro galvanic action produced by gold being in apposition to dentine, and producing decay, has had its day of small sayings without proofs, and is seeking a retired place for silent *interment*, for the reason that it could not find either god-father or a reliable god-

mother as sponsors to assume the responsibility of its future well being, as it had no established scientific basis on which to depend.

We are informed that the *true inwardness* of the "new departure" is a very different thing from this. Its design is to teach us *how little we know* of the cause of "failure" in operations. This gratuity on the part of one who was possessed of this specific knowledge for eighteen or twenty years, but retained it within his own bosom until recently, is quite overwhelming. At least it seems that his bowels of compassion for suffering humanity were not moved until the fullness of time as approved by himself had arrived.

Is it not true that dentists in their practice are eclectic? Have they not, as a general thing, filled such teeth with gold when the quality of the tooth indicated its use? Have they not used amalgam when, in their judgment, the usefulness of the tooth could best be preserved thereby? Have not the oxychlorides and tinfoil had due prominence in the economy of dental practice? When doubt has existed as to saving the teeth by the employment of either of the above materials has not a resort to extraction been a reasonable practice?

It is true that many teeth have been sacrificed in the past, and will be in the future, for lack of knowledge and because of a prudishness as to reputation. Dead men tell no tales (not true, however), and their escape from implied indiscretion, by reason of the failure of some operations, is a personal satisfaction. It is reasonable to suppose that the employment of the above mentioned materials is due to a conviction that a tooth may be preserved longer and be more useful, and this from a *knowledge* of the *relative conditions* of the case.

It is a generally well known fact that "gutta percha" will preserve a tooth so long as it shall remain intact. Six months or a year will suffice to disintegrate such fillings in the teeth of patients whose oral secretions are viscid. In other and diverse cases these fillings will be worn away by attrition within a comparatively short space of time. They must be *frequently repaired.* Each sitting for repair is an additional expense to the patient, and in the lapse of one decade will aggregate a larger expense than would have occurred provided they had been filled with gold in the first instance, to say nothing of the loss of time. Let us not forget or

be unmindful of the frequent repair the "new departure" system subjects patients to.

It is my intention in this report to voice the general sentiment of dentists so far as I have been able to obtain their views; and give, as far as possible, an opinion which many years of intelligent practice has confirmed. I believe that no practical man expects to save all the teeth which he fills for a definite period. It is understood that although cavities in the teeth may be filled, *and filled perfectly*, we have little, if any, control over the causes which first produced the local destruction of dental tissue. Decay may seize any other portion of the tooth, or, indeed, may waste away the enamel and dentine in proximation to the gold.

Again, other teeth, which were not decayed when the above cases were treated, are found, after three or four years, decayed, not by the apposition of gold thereto, but as the result of viscid secretions or fluids, and perhaps for lack of proper care of the teeth. In such cases we have no use for the hypothetical; the evidence is clear and conclusive. So far as my knowledge and observation extend, there are few converts to the so-called "new departure."

I deem it proper in this report to give a brief summary of what may be considered general practice. The *contourist* claims that in good tissue the lost portions should be restored to nearly or quite the normal size, believing that nature, in her economy, is to be followed in order to secure the best practical results. My convictions and practice are in perfect accord with the theory above expressed. Operations of like character performed over twenty years since, are good to-day, and conclusively demonstrate the practicability of this style of practice.

We have the *radical separatist*, who, with file and chisel, cuts away both good and poor tissue alike, making no discrimination, leaving the teeth in a sadly demoralized condition. The excuse offered for this is greater facility in operating, larger degree of cleanliness, and less liability to decay. In poor teeth this practice is quite justifiable; indeed, the condition of the teeth as to quality makes it necessary, as the teeth can only be saved, if preserved at all, by this method. But why extend this practice to good and well organized teeth?

We have next in order the *more moderate separatist*, who is care-

ful to secure a sufficient general separation; but is also careful to give a much wider space on the lingual approximate surfaces, for the purpose of making the space self-cleansing, thereby retaining the good appearance of the tooth. This practice, so far as conditions may indicate, is to be approved and commended. The surfaces in such cases should be well polished.

Gold in the form of *pellets*, if non-cohesive, is well adapted for use at the cervical wall, and in large or small crown cavities cylinders are admissible; by some they are preferred. For the general use of cohesive foil I prefer ribbons, made by folding a sheet of No. 4 so as to make eight thicknesses, and then cut into such sizes as the case shall require. Gold in this form is adapted to cases where but little room for convenient operating is obtained, as it is very portable. The method of impacting, etc. etc., are too well known to be rehearsed in this paper.

Let us consider the claims which some of the "bleachants" now in use have upon our confidence. Chloride of lime, or, more properly speaking, *chlorinated lime*, has been used for bleaching discolored teeth. It has, however, fallen into disuse, for the reason that, although at first its use was satisfactory, future results did not justify its application. Chloride of sodium is open to like objection, from the effect produced upon the calcareous portion of the dentine, as well as upon the soft tissue. A grayish-yellow shade will appear within a short time, or at best within a few months.

Strong *spirits of camphor* is an excellent bleachant; it is very effective in a short space of time. It dissolves the pigment within the cells, as well as permeating the hard tissue, leaving no bad results. So much of the dentine should be removed as may be safe to do. The rubber dam should be in position, and the spirits of camphor applied for such time as may be requisite to attain the end desired. Then fill the *root* with gold in all cases. Fill the cavity with great care and thoroughness, and you will be well pleased with your success.

There has not transpired within the past year anything *new* with reference to the best mode of *extracting teeth*, a more effectual method of treating cases of *salivary calculus*, nor a surer method of disposing of *alveolar abscesses*. To extract an abscessed tooth, and then replace it, for the purpose of removing the difficulty, is objectionable practice, and should, in my opinion, be abandoned.

[The majority of the section would respectfully dissent from the statement that all roots of the anterior teeth should be filled with gold, believing, as they do, that other materials may be used for the purpose more easily and with equal success.

Also, they would state that they regard the replantation of teeth, for the cure of alveolar abscess, as good practice in certain extreme cases.]

REPORT ON OPERATIVE DENTISTRY.

By GEO. B. McDONALD, Member of Section Four.

PROPER MANAGEMENT OF PROXIMATE, CUTTING AND GRINDING SURFACES OF THE TEETH.

IN consideration of failures in our attempts to stay the ravages of caries in the proximate surfaces of the human teeth, I have decided to devote this paper to the showing of the causes of failures, with a view of refilling cavities on such principles as to guard the fillings from failure in the future. As the cutting and grinding surfaces of the teeth are often involved with the proximate ones, I deem it proper to include them in the few remarks I shall make upon this subject.

It will be sufficient for my present purpose to describe the proper preparation and filling of the proximate surfaces of a right-upper central incisor and right-superior first bicuspid, where the cutting surface of one and the masticating surface of the other are involved, they having been previously filled and now requiring to be refilled. Before giving a description of such an operation as should be performed upon the central incisor referred to, let us first ascertain the cause or causes of the failure of the fillings previously introduced. If we succeed in finding this we shall undoubtedly be able to see our way clear to successfully fill this tooth, so that the operation cannot fail again. After a careful examination of the tooth in question we arrive at the following conclusions: *First.* We did not have room enough, laterally, to fill the tooth properly, as we wedged the same day we filled it, when we should have pressed it and the adjoining tooth apart for one

week or more, as circumstances might indicate. *Second.* We did not properly anchor our filling in the cervical, palatal and labial walls of the tooth. *Third.* We did not bevel the margins of the cavity thoroughly, especially at the cervical margins, leaving a frail and partially disintegrated structure which continued to disintegrate after the fillings were inserted. *Fourth.* We packed our gold at the cutting edge in enamel, which shows that there were checks in the cutting edge of the tooth, and these checks caused the cutting edge to split off when exposed to the forces used in biting hard substances. *Fifth.* We discover that too large pieces of gold were used, and not perfectly impacted. Only one hour was spent on them with an automatic or hand mallet, when, to make a perfect operation, we should have spent a much longer time, even with the use of the electro magnetic mallet, in impacting small pieces of gold foil into the cavity. *Sixth.* The gold was not finished down perfectly even, especially at the cervical margin, thereby allowing lodgments of destructive agents along the margin of the filling which caused disintegration of the enamel. These are six good and satisfactory reasons why our fillings failed, any one of which was sufficient.

With the knowledge gained in ascertaining why we failed, we will proceed to refill this tooth, with the intention of preserving it for twenty years or more. Having wedged it apart from the adjoining teeth from one-sixteenth to one-eighth of an inch, and having kept it in this position one week or longer, or until all soreness that has been induced in the peridental membrane by the wedging shall have subsided, we now apply the rubber dam; and, taking a proper shaped corrundum wheel, cut away that portion of the cutting edge of the tooth yet remaining between the cavity in the mesial and the one in the distal proximate surface more or less, as the case may require. Now, with proper shaped stone-cut engine burrs, we make retaining grooves through the cutting edge of the tooth, extending them to cervical, palatine and labial walls. With bud-shaped enamel burrs we bevel or properly shape the entire orifice of the now compound cavity, removing every particle of disintegrated tissue, and with a strip of No. o emery cloth polish off the external margins. With the hot-air syringe we blow out the chips that may be in the cavity and pronounce it ready for the gold. Now take one sheet of cohesive gold foil (No. 4), fold it

four times with a nickel-plated spatula, and with a pair of foil shears cut into strips one-sixteenth and one-eighth inches wide; take a strip of the narrow gold, anneal it slightly, and with a properly-pointed hand instrument anchor it in starting points made along the cervical wall of the cavity. Now with the electro magnetic mallet we proceed slowly, surely and perfectly to pack these small pieces of gold foil against the walls until we have restored the tooth to its original contour with solid gold, perfectly uniform in density from center to circumference, which will stand the force of incising food like cast steel, and cannot possibly be dislodged from its position without the breaking of the tooth at or near the neck. We now finish this filling with properly shaped separating saws, files and strips of emery cloth till it is ready to polish. The polishing is effected by the use of strips of crocus cloth and whiting on linen tape, with the assistance of the dental engine, flexible rubber cones and wheels.

On an examination of the right-upper bicuspid, which has previously been filled on its mesial and distal proximate surfaces, we find the filling partially out and the structure extensively decayed around the fillings, which would fall out were it not for the adjoining teeth. We find all the causes of failure that were present in the case of the incisor with two additional ones, namely: We left an organic fissure on the grinding surface of the tooth, which should have been opened into with a small, thin corrundum wheel and the two proximate cavities connected. We also find, upon an examination of the gold, that we had used too large pieces in filling, as cylinders, pellets and ropes of gold foil twisted up with our fingers. On taking the filling apart the gold separated easily, and each filling is made up of different large pieces of gold pressed loosely against each other, there being no cohesion of the gold—the condition that must exist in order to get the best results.

After wedging this tooth the same as the incisor, we apply the rubber dam and proceed to prepare for filling. When nearly ready we have a compound cavity presented, extending from the cervical wall of the mesial surface through the fissure to the cervical margin of the distal surface. We find that the walls of the tooth left standing are partially separated from each other, and that they are so attenuated that if left standing they will be likely to break off. We are more certain that this might occur when we

notice that each cusp is quite long, its antagonist having long cusps also. Our past experience has taught us, with this condition of things one or both of the cusps may be split off by the occlusion of the inferior teeth; so we cut off the cusps, using corrundum wheels of suitable form. After removing all the decayed portion we make starting points in the cervical walls and anchoring grooves along the palatine and buccal walls with a small stone-cut burr, having previously finished the entire margin of the cavity with a fine, sharp, bud-shaped burr, being sure not to leave a particle of disintegrated enamel at the orifice, where the gold and tooth tissue will be in contact and exposed to destructive agents. We proceed to fill, as before, by packing narrow, thin strips of gold into the starting points with a proper-shaped hand plugger, completing the operation with the electro-magnetic mallet, being sure to condense each piece thoroughly against the enamel and throughout the entire filling until we have restored the contour of the tooth, thereby making a gold crown with such gold cusps as can no more be split by the occlusion of the inferior teeth than could a crown of steel. Having finished this operation as we did the incisor, it is absolutely necessary that the adjoining teeth should knuckle up to the gold one, so as to come into perfect contact, to prevent food from getting between the teeth thereby irritating the gums, as is so often the case where V-shaped separations are made between them. If we have spent several hours on these operations, and have charged thirty or fifty dollars each for them, it will be infinitely better and cheaper for the patient than any other method.

I will here give a simple illustration of the principles involved in the method of operating which I have just given. If a barrel were hooped with common twine it would be a very weak vessel, and the staves would separate when but little force was brought against them. When a barrel is hooped with iron the staves become a unit, as it were. Such a barrel can withstand tons of mechanical force without being broken. The ordinary method of filling frail and extensively decayed teeth with cylinders, pellets and ropes of gold foil twisted up with the fingers and packed with automatic or hand mallet is to be compared to the twine-hooped barrel, while the process I have heretofore described is to be compared to the barrel with the iron hoops. A tooth

restored according to the method I describe will stand any necessary force without being split apart, because the enamel is supported by a solid band or hoop of gold as strong as steel. There are those who argue against cutting away too much tooth-structure. I assert, without fear of successful contradiction, that there are ten failures for the want of cutting away enough frail tooth-structure, to be replaced with rolled gold, where there is one from too much cutting.

"Haste makes waste," is an old maxim, and in nothing can it be better illustrated than when performing operations on the natural teeth. Hasty work is usually very imperfect, while operations upon which sufficient time is spent are more likely to be successful. I will here say that the value of clinics, to illustrate at our meetings that which relates to operative dentistry, cannot be overestimated. Finally, I would say that if we practice in accordance with the principles herein stated our efforts will usually be crowned with success, and the teeth of our patients saved and restored to their former usefulness for many years.

VOLUNTEER PAPER ON OPERATIVE DENTISTRY.

By THOS. C. STELLWAGEN.

THE NATURAL DENTINE FOR CAPPING EXPOSED TEETH PULPS.

SOME time since I called the attention of the dental and medical professions to the use of the actual cautery, by means of a coal of fire made by igniting hickory pivot wood, such as is prepared for dentists by being seasoned and condensed by passing through steel draw-plates.*

It is recommended by its simplicity, inexpensiveness and efficiency. Use has proven it of value in treating superficial abnormal growths, hæmorrhage, sensitive dentine, etc.

* See "The American Journal of the Medical Sciences," No. CXLVI, New Series, April, 1877, page 561, Philadelphia, Henry C. Lea; and "Johnston's Dental Miscellany," page 155, Vol. 4, No. XL, April, 1877, New York, Johnston Brothers; and "Medical and Surgical Reporter," May 5, 1877, page 403, D. G. Brinton, M.D., Philadelphia.

To-day I ask you to consider the natural dentine for capping exposed teeth pulps.

It was during the examination of the last class but one that graduated from the Philadelphia Dental College that it occurred to me to seek for some more natural and simple means for the immediate covering of exposed dental pulp tissue.

The number of articles, already used for the purpose is so great, that the mere attempt to recall them requires considerable mental effort. I am about to add one more with the hope of shortening the list by having it universally adopted, to the exclusion of the others.

Medical science has demonstrated that where an ulceration of the skin has become chronic, the transplantation of small particles of epidermis from a healthy surface of the body, has the effect of assisting in the healing of the ulceration; the transplanted tissue cells acting as nucleuses about which the new first develop, as coral reefs in the ocean eventually become islands. A step further and we remember that small portions of bone or periosteum are often used in the same manner for producing centers of ossification, where bony tissue has been lost. They seem to resemble the points of ossification in the cartilaginous skeleton of the infant.

Attempts to assimilate the capping material to the dental substance have been made which are so ingenious and useful that it would seem to be a pity that they had not realized the hopes of their projectors. They serve, however, to show that all who study the operation wish to attain the greatest similarity of tissue.

Why not then use the tooth substance?

After removing the diseased structure, if the pulp is exposed allow the wounded surface to glaze over, and then, with a keen, sharp excavator, shave off from the walls of the cavity enough healthy dentine to cover over the point to be capped. After this is accomplished place a small metallic cap — platina I generally prefer—to which enough gutta-percha has been attached, by warming, to hold it in position, and proceed to fill, taking care not to displace this bridge, which is designed to protect from pressure and as an additional non-conductor of heat and electrical currents.

On no account wash or remove the powdered healthy dentine from the surface of the glazed pulp. Keep all other substances from coming in contact with this delicate tissue, whether they be

the so-called medicaments such as creosote, carbolic acid, chloride of zinc or even simple alcohol or water; they are foreign bodies and are apt to excite inflammation.

The operation as described has been most successful with me, and for about eighteen months I believe I have capped every exposed pulp this way. My successes embolden me to beg of you to accept my recommendation of it as worthy of trial.

VOLUNTEER PAPER ON OPERATIVE DENTISTRY.

By GEO. J. FRIEDRICHS.

EROSION OF THE TEETH AND ITS LOCAL TREATMENT.

I HAVE been greatly surprised to find, upon consulting the text-books of our profession, that so little attention has been devoted to so serious a disease as that which forms the subject of this paper. Hardly two pages in any one work on Dental Surgery, in the many that I have consulted, have been assigned to this subject. In my own practice (I do not know how it is with others), ten per cent of the persons consulting me for dental advice are suffering more or less from this disease, and the only remedy so far proposed, by the authorities who have written on this subject, is to wait until the disease has sufficiently progressed, so that the eroded part can be reamed out into a cavity and filled with metal, as one after another may threaten from its extent or depth.

This disease has been divided by writers into congenital and accidental. The former occurring previous to eruption, the latter at any subsequent period of life. I shall, however, confine my remarks in this paper to the accidental occurrence of this disease: this being a species of caries, characterized by gradual decomposition, first of the enamel, and afterward of the subjacent dentinal tissue of a tooth. Erosion, properly speaking, confines itself to the enamel, and it generally attacks a number of teeth at the same time, usually developing itself on their surfaces near the margin of the gums. The decomposed part of the enamel is white, and of a soft and chalky texture, generally very sensitive to thermal changes,

and to the touch. The teeth most liable to be affected by this disease are the superior incisors, cuspidati, and bicuspids, and singular to say, sometimes those only on one side of the mouth. The next most liable are the bicuspids and molars of the inferior maxilla. Occasionally the process begins at a number of points, and these, enlarging, finally coalesce, to the destruction not infrequently of all the anterior enamel wall.

CAUSES: I do not propose here to enter into my opinions, or to theorize on the probable cause or causes of dental erosion. I will, however, repeat the promulgated opinion of different writers, as to the causes to which this disease has been attributed, to wit, constitutional predisposition to viscidity of the fluids of the mouth, acrid secretion of the mucous membrane, utero-gestation, dyspepsia, altered condition of the system after anæmic and zymotic diseases, electro-chemical action. In the words of Dr. Garretson,* "The present conviction of the author is, that the true explanation is just now, for the first time, enunciated in the electro-chemical experiments made by Mr. Kencely Bridgman, and that in this direction will be found to lie not alone the cause, but the prophylaxis."

Prof. Harris † "is of the opinion that the loss of substance which characterizes the affection is produced by the action of acidulated buccal mucus."

Prof. Harris in the same work above quoted, in speaking of tartar, cites from other writers what is called by them green tartar, which I, however, shall class under the head of erosion, as his definition clearly defines this disease. For he says that "this consists of little more than a mere stain upon the teeth, and is usually confined to the labial surface of the upper incisors, cuspidati, and bicuspids. It is met with more frequently in children than in adults. It is exceedingly acrid, irritating the gums and decomposing the enamel of the teeth. This description of tartar, if it can be called tartar, is indicative of an irritable condition of the mucous membrane, and of viscidity of the fluids of the mouth."

Treatment.

We all know that the vital force is ever on the alert to combat the injury done through the destructive influences of disease.

* System of Oral Surgery, by E. Garretson, M.D., D.D.S. (page 505).

† Principles and Practice of Dental Surgery, Dr. Chapin. A. Harris (page 413).

We are also aware that a tooth attacked at a given point by irritating agencies will, step by step, break and give way before the irritant, unless it is counteracted by the efforts of nature or art, and in the words of Dr. Garretson, "not but what such repair is attempted, and indeed oftentimes successfully accomplished, as witnessed in tubular consolidation, where power sufficient exists to perfect the attempt, as seen in the process generally spoken of as vitrifaction, or eburnification, a mode of natural cure and resistance which no mechanical operation, however successfully performed, can equal." Now from the above premises it is self-evident, if we can bring assistance to the inherent vital force of a tooth, this disease — erosion of the enamel — can be cured. The agent to accomplish this is nitrate of silver,— for when applied to an eroded part of a tooth it puts forth its fiat and says: so far shalt thou go and no farther. The salt, when brought in contact with the organic matter of the teeth, is decomposed; the oxide of silver is deposited,— an insoluble and inert substance — which protects and relieves these portions of the teeth of their hypersensitiveness, antagonizes the action of the morbific influences, and assists the "vis medicatrix naturæ" to eradicate the disease. The method of using it is, to chip off of a solid stick of nitrate of silver a piece about the size of a pin's head, applying this to the eroded part of the tooth, moving it over the surface until dissolved or decomposed, taking care to keep it from coming in contact with the gums as much as possible. If after a week's time the sensitiveness to the touch has not been allayed, the application must be renewed at intervals until this is attained.

No danger need be apprehended of its too frequent use, as no injury to the teeth can possibly ensue, for the escharotic operation of lunar caustic is always superficial, and it is almost impossible to make it act to a great depth. The salt produces, along with its excitant effect, contraction of the tissue, or, in other words, acts as an astringent, and this property also constitutes one of its therapeutic recommendations.

Dr. Whitney states that* "oft-repeated applications will usually prevent pain, and in most cases, if not arrest, at least greatly retard, the injury to the teeth from clasps or denudation."

You will find that after a few applications the surface of the

* Dental Register of the West. Vol. vii, No. 3, April, 1854. (page 206).

eroded part will be covered by a thin film of the oxide of silver, which must be allowed to remain until the subjacent layer of enamel becomes solid and structural consolidation has taken place, after which it can be scraped off, and the surface polished.

But in connection with this local treatment the constitutional must not be neglected, for if the system is in an asthenic or anæmic condition, that predisposes or induces this disease, proper remedies must be prescribed to bring the system back to a normal state of health. Dr. Garretson asserts, "whatever shall tend to so consolidate or protect the parietes of a cavity as to render the parts impervious and insusceptible to external agents, *will save the tooth.*" I cannot refrain from copying another paragraph from him, my object being to illustrate the principles that I have tried to demonstrate in this paper. "The study of the vitality of a tooth, and the study of its adverse influences, is the study of vitality and the expression of irritation anywhere. The treatment of dental caries is both medicinal and operative. That the teeth, in their formative state, partake of the healthy or unhealthy condition of the system at large, all observers admit. But here, unfortunately, the matter has been left, most practitioners acting on the premise that such impressions are never altered. At such a conclusion it is impossible not to express surprise.

"There is a constitutional treatment for the carious tooth, as there is for the carious maxilla, and from a common standpoint are diseases of both to be viewed. It is not, of course, every case of carious bone that demands systemic treatment; neither is it so with the teeth; the source of offense in the one, as in the other, may be strictly local in character; but ill success must ever attend that practitioner who has not the inclination to look for a primary lesion outside of things strictly local in signification." In conclusion, if the above premises are correct, when a tooth is protected the process of secondary calcification or eburnification takes place, where power sufficient exists to perfect the attempt. It then follows that those who teach the doctrine of the *New Departure* are more indebted to the oxides or other chemical combinations that are formed from an amalgam filling, when brought in contact with the parietes of the cavity of a tooth, than to any special preparation or combinations of metals. For I have yet to see the tooth filled with an amalgamated alloy that has been preserved for any length of time without it was discolored.

DISCUSSIONS.

Dr. HUNT: I think it is a mistake to say that erosion is created by acids in the secretions of the mouth. I premise what I am going to say by detailing an experiment that can be tried by any member. If a natural tooth is dropped into a diluted acid, that acid will attack the earth salts of the tooth and dissolve them out, leaving the animal tissue in the general shape of the tooth. If, on the contrary, a natural tooth is dropped into a solution of caustic potash, the potash will dissolve the animal tissue of the tooth, leaving the earth salts friable, so that they can be scraped away. I have for a long time been of the opinion that this erosion is caused by the action of alkali, and not of acids.

Dr. FRIEDRICHS: Will you please allow me to ask you one question? If it is affected by either alkali or acids, how is it that you sometimes find cases where it attacks only the teeth on one side of the mouth?

Dr. HUNT: I will come to that directly. The theory taught in the books is that the secretions in the mouth should be alkaline in their reaction, and not acid. It is a question in my mind whether there should be alkalinity or acidity, or whether there should not be a neutral condition of the oral secretions in the main. In a perfectly healthy person the forces are so balanced that there is not sufficient acidity or alkalinity to produce injury. In abnormal conditions these secretions are altered, so that you find in some mouths a strong acid, and in others a strong alkaline, reaction. I have found some mouths with so strong an alkaline reaction over the whole territory that red litmus paper has changed to a blue color almost instantly.

Dr. ATKINSON: Were they all smokers?

Dr. HUNT: I have found the discoloration spoken of in the mouths of females who did not smoke.

I have also found this state of things, and it is a singular one to me, that while the general condition of the fluids of the mouth was of an acid character, yet by taking a corner of the red litmus paper and putting it up under the free margin of the gum, I found an alkaline reaction. Now I come to answer Dr. Friedrichs' question. I would find alkaline reaction in some parts of the mouth, and under the free margin of the gum, and find it varying in degree in different parts of the mouth.

Dr. FRIEDRICHS: If there is any secretion that produces this disease it must be that from the mucous membrane. I think that it is one of the causes that can produce the effect, and account for the disease being met with sometimes on one side of the mouth and not on the other.

Dr. STELLWAGEN: This alkalinity of which you speak, do you consider it to be a secretion or excretion; or do you suppose that it may have been caused by the remains of some alkaline tooth-powder?

Dr. HUNT: I have found it (erosion) in the mouths of patients who did not use tooth-powder. All my observations have led me to the conclusion that this alkalinity is due to the abnormal condition of excretion of the gingival membrane. Finding a different degree of alkalinity in different localities, accounted to me for the fact that some teeth were attacked and some were not, and it also led me to believe that a portion of the margin of the gum could be in a pathological condition, and another portion, in a different part of the mouth, and even nearly contiguous, might be perfectly healthy. I have heard this erosion of teeth attributed to mechanical abrasion, produced by the use of a tooth-brush and powder, and the advocates of that doctrine have said: "You find that, while the teeth have been eroded rapidly at one period, that erosion has suddenly ceased, and there is no further progress of it." If these cases were investigated, they say it would be found that the patient had been using a harsh tooth-brush or a harsh powder at that period, and had ceased to use it; but I think it can be more reasonably accounted for on the ground that at the time this erosion was progressing, the organs excreting this alkali in abnormal quantities were in a pathological state. A change took place in the system when these excretions became normal, and then the trouble ceased.

I wish to mention a case which came under my observation a number of years ago.

A lady of over seventy years, who had taken peculiar care of her teeth, the tissues of whose mouth were in a healthy condition, had, on the labial surfaces near the gum of the lower central incisors, this erosion. It extended to the proximal surface of the teeth and then ran up in a groove nearly to the cutting edge. That groove was cut deep, and as smooth as if it had been pol-

ished. I have found a great many cases presenting this appearance. None of them gave any indications of agents at work such as we find in what we call the true decay of teeth. I think we cannot place too much stress upon the position that is taken in the paper of Dr. Friedrichs, and by the authors whom he quoted, that we should always diagnose our cases with a view to systemic treatment as well as local. I wish to state two cases in illustration.

A number of years ago a young patient, about fifteen years of age, the daughter of a physician, came to me with every indication of a rapid, general decay of the teeth. I immediately tested the secretions of the mouth and found there was a strong acid reaction. At my suggestion her father subjected her to a course of medical treatment, to correct the acid condition. In from three to six weeks this was almost entirely corrected, and I then filled the teeth, and they have not changed since that time, which was eleven years ago. She has had occasion to have but one additional filling placed in her teeth. Since that I have invariably, when I found this aggravated acid condition, sent my patients to physicians, who have in every instance corrected the evil. I had another case of two young girls who were twins, having apparently the same formation, structure and development of teeth. I filled quite a number of cavities, but not very large ones. After that they came to me again in two years for examination. I found that there was a state of general destruction of the teeth of one of them, but the character of the decay differed entirely from that which was produced by acids. I tested the secretions of the mouth and found them strongly alkaline, and I have always found that the appearances and symptoms attending the destruction of teeth by this alkaline agent to correspond in all particulars with those observed in the teeth of this girl of whom I speak. I wish to say that I would have presented a report as chairman of the section having charge of chemistry at this meeting, but I had it not sufficiently matured as a paper from a section should be.

Dr. Darby: I doubt not many of the members present have been in the habit of treating erosion of the teeth with nitrate of silver. Such has been my practice for years. It has, however, one serious objection, namely: that it discolors the teeth, and in the anterior part of the mouth this is a serious objection to its use. Nor is it always a sure remedy unless applied quite frequently.

Some two or three years ago my attention was directed to a new method of treating this disease by using the galvano cautery, as introduced by Dr. Oscar Solomons, a German who was associated with a friend of mine. It consisted, as most of you may be aware, of a strong battery, from which was passed a current of electricity through platina wires of various sizes. It was used for obtunding extreme sensitiveness in the dentine, and to my knowledge quite successfully so in a number of instances. The current of electricity was sufficiently strong to heat the platina points to a white heat, and these were brought in contact with the eroded surface of the tooth, or when excavating sensitive dentine the point was touched for a moment with the heated wires. The great objection to its general use is that it cannot be used in cavities difficult of access, because the platina points are made to touch each other, and of course the current is broken and the effect lost. When it can be used for erosion of the teeth, I should much prefer it to nitrate of silver, which cannot always be used without coming in contact with the soft tissues, and being a powerful escharotic it will destroy those tissues.

So far as I am aware, Dr. Stellwagen's method of capping tooth-pulps with scrapings of dentine is original with himself. I do not, however, see much in it that promises to be of value. If I were to cap pulps with tooth-structure I should get my material in a different way. I should prefer making shavings from a tooth which had been extracted. When we scrape dentine from a living tooth it becomes dead material, whether it has been removed two minutes or ten days.

Dr. STELLWAGEN: How do you know that?

Dr. DARBY: I am pretty sure that it is dead material. What *evidence* have you that it retains life after its connection with the living structure has been severed?

Dr. STELLWAGEN: The question is a very easy one to ask, but I could not answer, and doubt if any one can. We presume that transplanted skin or bone does not lose its vitality, so I say this death of the dentine, which my opponents assume takes place, remains to be proven; meanwhile the operation stands successfully.

Dr. DARBY: Of course we do not know the action upon the pulp. We all know that many pulps in many constitutions will bear an enormous amount of irritation without giving future

trouble. We know this from the irritating substances used in capping, but I should be very careful how I used scrapings of dentine for the purpose mentioned. If I understand Dr. Stellwagen, his practice is to put the scrapings of dentine in contact with the pulp and then cover them with some plastic material. His success is doubtless owing more to the capping which follows than to the benefit derived from his scrapings of dentine. Personally, I have had little trouble in capping pulps (recent exposures) with oxychloride of zinc. This (I know from frequent conversations with him in the past) has not been in keeping with his experience. I am prepared to say that I am successful in saving at least 90 per cent of all pulps capped, if the exposure has been a recent one, with no previous irritation. My practice is to first cover the exposure with oxide of zinc and creasote, made in a thick paste, and then add the oxychloride afterward.

I wish to say a few words upon the subject of the so-called new departure. I think it has received about as much public attention as it merits. Every practitioner at this time has made up his mind with reference to the principles set forth by the disciples of this new creed. I regret, however, that there are to be found many men who accept the creed and practice it upon the authority of others because it promises less labor and the same, or nearly the same, pay. Did I wish to make a lazy sloven of my fellow-practitioner I would preach to him the doctrine of the new departure. I would tell him that amalgam and gutta-percha, and the oxyphosphates and oxychlorides were better than gold; that when he had made beautiful fillings of gold (*which did not leak*) he had done the worst thing possible for his patient. The chief danger is not with the strong men in the profession, who are not moved by everything which appeals to ease and comfort, but with the men who joyously fall in line with that which makes dentistry easy work. In Philadelphia—I speak not for all Philadelphia dentists, but for many personal friends and acquaintances—we do not take very much stock in the so-called new departure. We look upon it as a slovenly method of practicing dentistry. I am firmly of the opinion that the man who publicly promulgates the doctrine of the new departure is doing more injury to the dental profession than he would do good if he lived to the age of Methuselah.

REPORT OF SECTION FIVE

ON

PHYSIOLOGY.

By M. S. DEAN, Chairman.

THE ORIGIN OF THOSE NESTS OF DENTICLES GENERALLY DENOMINATED "DENTIGEROUS CYSTS."

ALTHOUGH I have given considerable thought to this question, I do not claim that I have solved it with absolute certainty; but will give the conclusions to which I have arrived, and the histological and physiological facts upon which they are based.

In glancing over the literature upon this subject, I find the only histological account of these anomalies, of any value, is recorded in the Transactions of this Association for the year 1875. The mode of the *origin* of these abnormal productions, as there presented, is not, however, in accordance with well-established anatomical and physiological facts. And yet the theory was an ingenious one, and the suggestions it contained pointed very nearly in the right direction. The great initial error in the theory there advanced was in regarding the tooth-germ as a single cell, instead of an aggregation of cells. It was suggested in that report that a tooth-cell (or "mother-cell," as it was there termed) might, in an abnormally active condition, generate other tooth-cells; and from the latter these dwarfed teeth might originate.

I submit the following facts, as the foundation of the theory I am about to offer: 1, that the teeth are developed from two distinct histological elements; the enamel from the epithelium or *epiblastic* layer; the dentine from the dermis or *mesoblastic* layer; 2, that the enamel-organ becomes largely developed before the slightest trace of the dentine-papilla makes its appearance. Indeed, there are many facts that tend to establish quite conclu-

sively the theory that the development of the papilla is induced by and through the presence and influence of the *epithelial* body, constituting what is denominated the enamel-organ. Keeping these facts in view, let us look at a few histological facts, which are familiar to all embryologists who have examined the fœtal jaws during the later stages of intra-uterine life. Upon examining subjects, soon after the rupture of the epithelial cords is effected, (cords which up to this time had connected the dental follicles with the epithelial layer of the mucous membrane) large masses of epithelial cells will be found attached to their extremities; and sometimes detached aggregations of these cells are found scattered in various directions in the embryonal tissue.*

These epithelial proliferations vary greatly in quantity, and usually disappear before the teeth (from the cords of which they originated) are fully developed. I claim that under favoring conditions these epithelial masses may become enamel-organs, more or less imperfect, it is true; and that these enamel-organs may induce the development of corresponding dentine-papillæ; and also that these two organs may pass through all the successive phases of development that occur in the evolution of the normal dental organs. The magnitude of these abnormal teeth, and the perfectness of their structure, must depend upon the volume of the epithelial masses which constitute each individual enamel-organ, and upon the nutritive supply that may be furnished to them. It is not necessary for me to elaborate this idea further. I will, however, direct attention to a few facts which I think corroborate this view. We find, for instance, that the development of the teeth is not confined to their legitimate territory — the maxillæ; but that they may be produced in various and remote parts of the system: the bladder, the scrotum, the vagina, the eyebrows, etc., and in the ovaries, which are the favorite seat of these anomalous growths. These are well known facts; and these abnormal productions are admitted to result from the *epithelium* which has become invaginated in a fold of the mesoblastic layer; in other words, some epidermal cells have become invested within the dermal

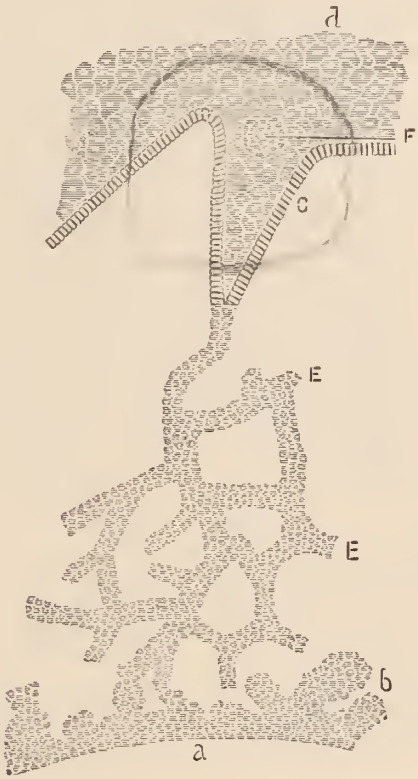
* These epithelial masses have been noticed by many histologists. By Serres they were believed to be *tartaric glands*. They have been observed by Magitot and Kölliker. but these writers have not assigned to them any physiological significance; Kollmann, however, claims that the enamel-organs of the supernumerary teeth are developed from an accumulation of these epithelial bodies.

tissue — circumstances which may more naturally occur in the tissues of the jaw than in the distant regions just referred to.

The histological facts alluded to in the above report are represented in the cuts here presented, which are taken from a treatise on the *Origin and Formation of the Dental Follicle*, by Drs. Legros and Magitot.

Fig. 41 represents a section taken from the jaw of an embryonal calf, magnified 260 diameters. The cut embraces the region external to the dental follicle (a) which latter is not shown in the figure.

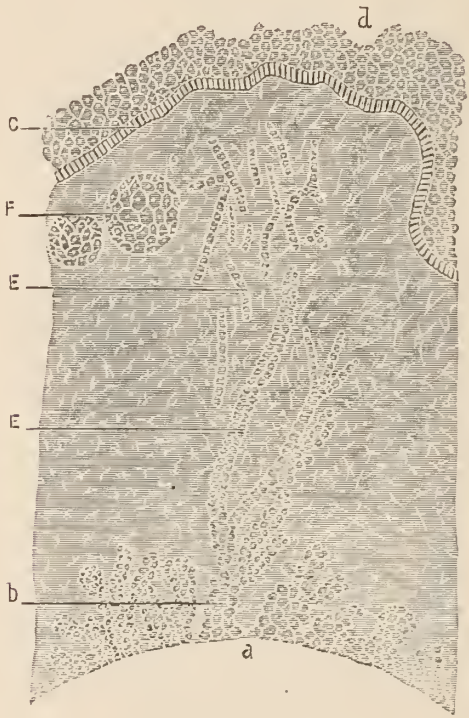
FIG. 41.



b, Epithelial buddings upon the follicular wall; c, columnar layer of the oral epithelium; d, oral epithelium; E, E, *débris* and buddings of the cord; F, epithelial globule in the epithelial *lamina*.

Fig. 42. Section taken from an embryonal calf, and embracing the same territory represented in fig. 41. Magnified 100 diameters.

FIG. 42.



a, Segment of the follicular wall; b, epithelial buddings upon the wall; c, columnar layer of the oral epithelium; d, oral epithelium; E, E, *débris* and buddings of the cord; F, epithelial globules from the débris of the epithelial lamina, which in the report are supposed to furnish the enamel-organs of the denticles found in dentigerous cysts.

DISCUSSION.

Dr. PEIRCE: I regret my inability at the present time to present to the Association a synopsis of the labors of the German histologists during the past year upon cell development, for I understand that much in that direction has been accomplished. I take great pleasure and intense satisfaction in bringing to the notice of the Association a work from the hands of the chairman of the section, Dr. M. S. Dean, on the "Dental Follicle," advance sheets of which I have had the honor of reading. It is a translation from the French authors, Drs. Legros and Magitot. I would warmly commend it to all of those who desire to become familiar with the origin of the tooth-germ and its subsequent development. It is especially adapted to the student by the familiar, conversational style in which the translator has presented it. It is, indeed, a book that every earnest seeker after truth concerning this complex portion of the human economy must possess.

PHYSIOLOGICAL OBSERVATIONS

ON THE

ACTION OF NITROUS OXIDE

($N_2 O_3$).

By JULIUS G. W. WERNER.

The three characteristic periods are:

1. Predominating inspiration.

2. Predominating and forcible expiration.

3. Gradual lessening and fainter-growing inspiration, till definite respiratory paralysis is established.

Its effects and phenomena:

1. Narcotism, presenting the phenomena of increased frequency of the heart's action (cardiac systole and diastole), with decreased frequency of respiration and loss of reflex action.

2. Asphyxia, presenting the phenomena of a feeling of a want of air (suffocation), with involuntary muscular contractions or convulsions, the convulsions being less violent than in ordinary asphyxiation caused by total deprivation of common air.

3. Anæsthesia. Complete anæsthesia is brought about by the combined influence of narcotism and asphyxiation.

4. The two periods of blood tension.

5. The danger of apoplexy.

I am sorry to say that I have been unable to summarize what I meant to, in written form, but I have tabulated on the blackboard a few heads on which I will speak briefly. Whatever there is in these remarks worthy of attention, or that will give practical information to the dentist, is to be attributed to Professor N. Zuntz, a German physiologist, as the result of thorough and extensive experiments in his laboratory.

Your attention is first called to the three characteristic periods; by that I mean the periods which would be very distinctly rec-

ognized by every one who administers nitrous oxide. The first is that of predominating inspiration; the second of predominating and forcible expiration, and the third, of the gradual lessening inspiration until a definite respiratory paralysis is established. In other words, when we administer nitrous oxide, it will be observed that the individual starts with taking the gas very freely; he wants a great deal of it in the first few inspirations, and unless he gets it he at once feels asphyxiated. In the second stage the very opposite of this will be observed. He will blow all the air out of his lungs that he can, and will not seem nearly as anxious to get more in. If we carry him still further, we bring him to a condition in which he will take but very faint, quick inspirations—gasps—until he will hardly inspire at all.

Under the head of its effects and their phenomena, we notice: *First.* That nitrous oxide narcotizes—by that we mean, it causes increased frequency of the heart's action and decreased frequency of respiration, which makes narcotism. Nitrous oxide has, when inhaled with sufficient common air, or oxygen, this narcotic principle. This shows itself in all animals that suckle their young, by a lessening of the tonic excitability of the vagus nerve which supplies the heart, and a decided decrease of the frequency of respiration,— which means that the inhibitory centers of respiration are narcotized to such a degree that the neural current, from without to within, and from within to without, is interfered with in its regular molecular propagation.

In breathing pure nitrous oxide, the frequency of the heart's contraction and dilatation increases from the beginning, but the frequency of respiration does not decrease so much as when an indifferential gas is inhaled. It seems to be the general understanding that nitrous oxide is not a differential gas, but I think upon that point that everything is not as yet known. As I understand Dr. Atkinson is on the opposite side, he will perhaps give some explanation of this subject. I understand that he thinks the oxygen is utilized to some extent—in other words, that it is taken up. The gentleman who made the experiments of which I am speaking is not conclusive upon that point, from the fact that it is very difficult to analyze the exhalations, as well (as he claims) as to keep nitrous oxide pure, it being very difficult to get an apparatus from which perfectly pure nitrous oxide can be administered.

We observe: *Second.* That asphyxiation is produced by nitrous oxide. It has been generally considered by the dental profession, almost up to the present day, that nitrous oxide has no other effect, when inhaled by the human being, than that of asphyxiation. That this is not so, is clearly shown by experiments upon animals; for when they are placed in pure nitrous oxide they lose the power of reflex action in a few minutes, while when placed in pure nitrogen they lose this power only after many hours—and some animals lose it only very little. In this asphyxiated condition we notice that the convulsions and the distress for want of air are less when nitrous oxide is inhaled than in ordinary asphyxiation. In the latter we have extensive convulsions, the subject struggling violently, while the muscles contract forcibly. These conditions are much less marked from the inhalation of nitrous oxide, and in some cases are extremely slight. We can then have narcotism and asphyxiation without much convulsion, though if we closely observe, there will always be convulsions of some muscles, principally those of respiration. Thus far we have established narcotism, and also asphyxiation.

We shall next observe that complete anæsthesia is brought about by this combination of narcotism and asphyxiation. We do not have narcotism alone, nor asphyxiation alone, but we have a thorough combination of these two conditions. Under the fourth head we will notice the two periods of increased blood tension. That there are two periods of increased blood tension should be known to every one who administers nitrous oxide. Here we reach the practical point, and that is whether nitrous oxide *ever* becomes dangerous, and *when* does it become dangerous. The increase of blood tension, so far as appears, presents itself in a twofold manner, the first being noticed during the asphyxiating period; the second on recovery of the subject; and this secondary increase of blood tension is often, yes, almost always, the one that reaches the highest point, and may, therefore, become dangerous. The whole vascular system is governed by the vaso-motor nerves, which are a very peculiar system of nerves. When we pinch a vaso-motor nerve, or break it, or disturb it in any way from its normal physiological condition there is at once a decidedly perceptive result noticed on the vascular system which supplies those parts. There are oftentimes more than two decided effects following each other.

First there will be a manifest contraction, and then there will be a varying dilatation.

The fifth point is the danger from apoplexy. This is the last and perhaps the principal point I wish to bring out, one which touches every one of us who administers nitrous oxide, and that is, the danger in either one of these periods of increased blood tension, the period of recovery (the one when the individual is coming to himself) being the more dangerous. The injury is often so great that there is a predisposition brought about in certain vessels to dilate very freely, and from the effects of which the patient may never entirely recover. We all have heard of people who have taken nitrous oxide who have said, and say now, that they have never felt exactly as they did before they took it. Undoubtedly such cases are attributable to the fact that they have been narcotized by the gas to such an extent as to have brought about a very free dilatation of the blood-vessels of the brain and heart. This tendency for dilatation may not diminish for many weeks, months, years, or perhaps never. It is easily excited by fear or other emotions, so that in any system in which there is a predisposition to apoplexy, or of the blood-vessels to easily and extensively stretch out and dilate, nitrous oxide would seem likely to be decidedly prejudicial. Notwithstanding, we must still come to the conclusion that nitrous oxide is, comparatively speaking, a safe anæsthetic. People who more generally take nitrous oxide are fortunately not the kind who inherit a predisposition to apoplexy. They are mostly a class of people who care little for their teeth, who are not always mentally cultured nor mentally overworked, and in such people there is little danger. You can carry them off pretty far, while if you have a man who is easily excited, or who is a brain-worker, you can easily carry him to a stage where it is very dangerous, and where you would do him everlasting injury. I had this matter illustrated once in my own practice in a very forcible manner, which I shall never forget; and from that time I have given much attention to the study of this subject.

A young man presented himself for extraction of a left inferior third molar, which had been in a very painful condition for a number of months. I had advised him that in the long run it would be best to take the tooth out, but he delayed it for some time—till

he had been working hard at book-keeping and had been kept up late at night writing and studying—when one morning he presented himself in a very hurried and excited condition, suffering intense pain, and determined to have the tooth out immediately. I administered nitrous oxide gas, sending him thoroughly off beyond the second stage, where he was thoroughly narcotized as well as asphyxiated. The tooth was removed before he became conscious. When he came to again, and while he was yet resting in the chair, he very suddenly jumped up, and I grasped him. He put his head between his knees and hands and said, "O God! how my head aches; it is going to split!" I was a little alarmed and told him to lie back, and applied cold water. Upon feeling his pulse it was very forcibly impressed upon my mind that in this case there was an intense secondary blood tension. It proved to be so great that he did not recover his senses perfectly for more than half an hour. I applied ice to his head and gave him in the neighborhood of 20 or 30 grains of bromide of potash. In about half an hour he left the office. He went to his business, and finding he was unable to work went home and sent back word that he felt very restless, and wanted me to send some more of that medicine, as he thought it helped him. I sent him two large doses of bromide of potash and two doses of sulphate of morphia, giving him instructions to take the bromide of potash at half-hour intervals, and if he was not asleep after taking that to take one dose of sulphate of morphia, and twenty minutes after that the second dose. He went to sleep without the morphia and was all right the next day.

DISCUSSIONS.

Dr. Osmond: I have had a great deal of experience in administering nitrous oxide, and of late years I have come to the conclusion to withhold it in a great many cases where formerly I would have administered it without any fear. I have known of many who suffered from chronic headaches, from paralytic symptoms, from aberration of mind, and even of some parties who have been taken to the lunatic asylum from the reckless use of the gas. One case of the latter class I was fully conversant with — a lady who has now been nine years in the lunatic asylum at Longview, Cincinnati, Ohio, sent there by nitrous oxide, administered at the

Colton Dental Association. I wish to suggest a few very simple rules. There is a time, and you will all understand me, when nitrous oxide must not be given to females under any circumstances. One week before that time they should not take it. Three or four days after that period has passed it may be given, provided all other things are right. In the change of life it should not be given. Now for the cause of these things. In cases where females are affected in this way, it is owing to the condition of the blood-vessels of the uterus, and to the reflex action consequent, which causes a condition of the brain which is most unfavorably influenced by the administration of nitrous oxide. Again, during the hot summer weather, when people are liable to sunstroke, I make it a practice not to use nitrous oxide. Usually the blood is in such a condition from the long continued heat as to render it unsafe. It is not the death of the patient in the chair that we have to dread, but the after troubles, which may embitter the whole life.

Dr. Peirce: I wish to commend Dr. Werner's remarks because of the lesson of caution they teach us. I have patients who have suffered, and still suffer, from the effects of nitrous oxide. (The speaker briefly sketched several cases of serious illness coming under his observation, directly traceable to it.) One of these, a physician, lost forty pounds in weight, and was a constant sufferer from diabetes; another never knew a well day from the time he took the gas, and, after suffering a year and a half from diabetes, died; several ladies within my knowledge did not recover from its effects in six or eight months.

Dr. Atkinson: If I felt disposed to self-glorification, I should be very happy to-night. Years ago I told you this very same thing; the mere mass generalizations are so pronounced that no one could see what the trouble was. Dr. Werner has really taken hold of this in a scientific manner, although handicapped by the wretched phraseology that pertains to the brochure that he has given us a synopsis of. Blood tension has been spoken of. How many men in this room understand what the blood tension is, and how it is produced, and how it is controlled? Probably the anæsthetic that is considered the most dangerous is the safest one known in the whole field of anæsthetics — I refer to chloroform. There is no such thing as the *physiological* action of *nitrous oxide*

on the human body. If it is *physiological*, it comports with health. If it is *pathological*, in the name of veracity, say so. There is not a tooth in the most tender mouth in the world that the operator cannot remove without any anæsthetic but the love of God beaming in his own eyes toward his patient, for his good, and not for the dirty dollar. Who has understood what respiration is? The author of this work has not pursued the subject down to its minutia, and asked himself how it is that oxygen operates upon the blood by the mutations of molecular affinities, and why it is that 96 per cent of the inhaled oxygen that has been in the lungs by inhalation becomes deprived of the power to support respiration in its bonds of affinity being put asleep, so as to be unable to unite with the blood through the walls of the air-vesicles and blood-vessels into the blood circulating in capillaries around the air-vesicles and thereby be introduced into the circulation, so that it can enter into combination and construct the protoplasmic elements of the tissues, so that nutritive activity and nourishment in general may go on properly. What becomes of that killed oxygen; and how is it that when it is once thrown out of the lungs that it still remains effete?

There is no known means yet revealed whereby we can awaken the narcotized bonds of affinity in the oxygen which has once been in the grasp of the lungs, except by passing it through the vegetable kingdom, and then it is fit for animal respiration. These are the questions we must inquire into before we are able to understand how it is that the vaso-motor system is influenced by the oxygen that has been received into the blood-circulation, to hang on loosely by an oxygenating process, a sort of quasi-oxidation of periphery of the red blood corpuscle, whereby the oxygen molecules hang, like so many bees in a swarm, to each other, until there is some demand in needy territory, that they may receive an invitation of the affinities of the molecular mass, and thus enter into combination and construct tissual elements and have them in that state of tonicity that will prevent this immense "blood tension" that gives us the dilatations of the capillaries that is presented in such cases as *sunstroke*, where there is an undue amount of pressure in the atmosphere! How many men in going deep in mines have suffered from this tension? They often come out with a blood tension that they never recover from!

How is it that these men who have no idea of what they are doing, administer nitrous oxide? It is because these questions have not been examined. It is because they are unable to distinguish the difference between anæsthesia and apoplexy, and know not why it is that when we have free oxygen in connection with anæsthetics in the lungs, that a patient is safer than he was before. And then we must understand that a great many chemical questions are not yet settled. Why should we jump at conclusions and rush in like "fools where angels fear to tread," and administer these anæsthetics for the sake of getting filthy lucre, the use of which will draw us down into darkness?

Dr. WERNER: I thank Dr. Atkinson for explaining more fully what I termed narcotism. I think I agree with him as far as I did go; what I meant by narcotism was simply lessening or lowering the tonic excitability of the neural current. I think he will agree with me that death from anæsthesia, produced by nitrous oxide, is brought about in this way; further, that the store of oxygen holding tissues is reduced, and the blood corpuscles not being fed with oxygen, rush when the pure air comes into the lungs with an immense affinity for this oxygen that they could not make use of before, and thereby produce an effect on the vaso-motor nerves which causes such an intense secondary blood tension. Blood tension is a profound study, and no one that has never studied the subject knows what is really meant by blood tension. While I am generally opposed to anæsthesia being produced so freely by so large a number of incompetent men, still if a man who is well posted observes the three distinct periods which Professor Zuntz explains, and learns from his writings that at the second period anæsthesia begins and is already sufficient to last for any short dental operation, the mistake made in the case that I have cited in my own practice, and similar mistakes, may be avoided. I am quite sure that in the particular case that I cited if I had not carried the person off so far, which was done in order to have more time to perform the difficult extraction, but had stopped at the second period, the individual would have escaped with much less injury. I do not think I agree with Dr. Atkinson — and perhaps it is because I do not understand the subject as well as he does—in regard to chloroform, for I must consider chloroform as abominable and dangerous an agent as has ever been used in the healing

art, certainly for the dentist. I will tell you my reason for it. There are not so many people, in proportion, who die from taking chloroform for amputations as die from the simple operation of tooth extraction.

The only explanation which we have is that in fatal cases from extraction under chloroform administration the fatal moment is brought about when the nerves of the tooth are separated from the main branch, when we sever the tooth-pulp or its nerves, or those of the periosteum from the main trunk of the nerve. It is then that a reaction of reflex kind travels along the trunk of the trigemini whose posterior or motor root is closely connected with the vagus, the nerve supplying the heart, and a shock to the latter nerve under chloroform narcosis when the nerves are all in a depressed condition is a most dangerous thing, and it is likely that the shock under these conditions is what makes extraction under chloroform so dangerous.

Dr. Barrett: If we are to make this Association more useful than it hitherto has been, to have the work more perfectly done, it must first be thoroughly digested in the sections. The fifth section has sustained a great calamity in the loss of Dr. McQuillen, who was to have prepared a report on Physiology. I hope another year we shall have recovered from this stunning blow, and that a thorough report will be prepared. I have in my mind, if some present expectations are realized, the plan of performing some physiological experiments before the section, and it seems to me such demonstrations might be made extremely useful.

TRANSACTIONS

OF THE

AMERICAN DENTAL ASSOCIATION

AT THE

TWENTIETH ANNUAL SESSION,

HELD AT BOSTON,

COMMENCING ON THE 3D OF AUGUST, 1880.

PUBLICATION COMMITTEE.

GEO. H. CUSHING, M. S. DEAN, E. T. DARBY.

PHILADELPHIA:
TRUSTEES OF SAMUEL S. WHITE, PUBLISHERS.
1881.

DISCLAIMER.

The American Dental Association, although formally accepting and publishing the reports of the various Standing Committees, and the essays read before the Association, holds itself wholly irresponsible for the opinions, theories, or criticisms therein contained, except when otherwise decided by special resolution.—*Constitution.*

CONTENTS.

	PAGE
Disclaimer	2
Officers for 1879–80; 1880–81	6
Roll-call	7–11
Adoption of Executive Committee's Programme	11
Invitation from dentists and dental-goods dealers to a drive	11
Invitation from the city authorities to an excursion	11
Report of Publication Committee	11
Report of Treasurer	12
Action on amendments to Constitution	12, 13
Motion of Dr. Buckingham to amend verbally	13
Report of Committee on Credentials	13
Action on the letter of Dr. Birge	14
Action on Section 2 of Article III. of Constitution	15
Resignation of Dr. R. Finley Hunt	15
Report of Committee on Consolidation of Societies	15
Extending courtesies of the floor to Dr. Field, of London	16
Report of Committee on Directory	16
Resolutions regarding published endorsements of materials, etc.	18
Motion inviting Dr. Tucker to address the Association	19
Auditing report of Publication Committee	19
Auditing report of Treasurer	20
Appointment of a committee to draft resolutions on the death of S. S. White	20
Vote of thanks to the dentists and dealers in dental goods of Boston	20
Presentation of instruments by Dr. Talbot	20
Change time of electing officers	21
Invitation from the Secretary of the Art Museum	21
Appointment of a memorial committee on the death of Dr. H. L. Sage	21
Appointment of a committee on International Congress	21
Resolution instructing the Publication Committee	21
Motion to discontinue the payment of salaries to Treasurer and Secretary	21
Action on resolution instructing Publication Committee	22
Adoption of resolution recommended by the Section on Education	22
Reorganization of Sections	23
Selection of next place of meeting	24
Election of officers	24
Resolution instructing Treasurer to pay bills	24

PAGE
Resolution of thanks to Local Committee, reporters, and others . . . 24
Resolution of thanks to City of Boston 24
Resolution of thanks to retiring officers 24
Resolution of thanks to Institute of Technology 24
Resolution of thanks to the retiring President 25
Resolution of thanks to officers of the Art Museum 25
Committee on International Congress 25
Report of Committee on death of Dr. Sage 25
Report of Committee on death of S. S. White 25
Installation of officers 25
Local Committee, appointment of 25
Publication Committee, appointment of 25
Notices of amendments to Constitution 26
Memorial pages 27, 28, 29

REPORTS AND VOLUNTEER PAPERS.

Section I.

Report by C. S. Stockton, Chairman 163
Volunteer Essay on Dental Art, by Eben M. Flagg 164

Section II.

Report on Education, by J. N. Crouse, Chairman 139
Supplemental Report on Education, by T. W. Brophy 141
Supplemental Report on Education, by L. C. Ingersoll 142

Section III.

Report on Nomenclature and Terminology, by W. H. Atkinson, Chairman. 133

Section IV.

Report on Operative Dentistry, by E. T. Darby, Chairman *pro tem.* . . . 56
Volunteer Essay, "Oral Electricity and the New Departure," by John J. R. Patrick 57

Section V.

Report on Anæsthesia, by W. C. Barrett 100

Section VI.

Report on Cases of Diseased Antrum, by W. N. Morrison 31
Report on Certain Therapeutic Agents, by C. A. Brackett 32
Report, "Taking Cold" and Hyperæmia, by F. M. Odell, Chairman . . . 42

VOLUNTEER PAPERS.

Essay on the Unwritten Law of Dental Ethics, by C. A. Marvin . . . 125

DISCUSSIONS.

Therapeutics—discussed by
Dr. Meriam 49
Dr. Andrews 49

PAGE

Pathology—discussed by
Dr. Morgan 50
Dr. Werner 51, 53
Dr. Atkinson 52, 53
Dr. Mills 54
Operative Dentistry—discussed by
Dr. Tucker 70
Dr. Atkinson 72, 74, 75, 87, 88
Dr. Buckingham 73, 75
Dr. Allport 74, 75, 78, 79, 80, 81, 92
Dr. Morgan 78, 79, 80, 88
Dr. Barker 79
Dr. Dickerman 79
Dr. Fillebrown 81, 82
Dr. Thomas 81, 82, 86, 87
Dr. Taft 84, 86
Dr. Goddard 84
Dr. Friedrichs 89
Dr. Lord 90
Dr. Stockton 90
Dr. Cook 92
Dr. Webb 93
Dr. Wetherbee 94
Dr. Mills 96
Dr. Niles 97
Dr. Waters 98
Dr. Wilson 99
Anæsthesia—discussed by
Dr. Werner 115, 120, 123
Dr. Atkinson 116, 117, 120
Dr. Barrett 117, 119, 120, 121, 122, 123
Dr. Shumway 118
The President 120
A member 120
Dr. Brophy 121
Dr. Wilson 122
Dr. Buckingham 122
Dental Education—discussed by
Dr. Allport 148
Dr. Morgan 151
Dr. Buckingham 152
Dr. Stockton 154
Dr. Moore 155
Dr. Templeton 156
Dr. Barrett 158
Dr. Wetherbee 161

OFFICERS.

For 1879-80.

President	L. D. Shepard	Boston.
First Vice-President	C. N. Peirce	Philadelphia.
Second Vice-President	Geo. L. Field	Detroit.
Recording Secretary	Geo. H. Cushing	Chicago.
Corresponding Secretary	M. H. Webb	Lancaster, Pa.
Treasurer	W. H. Goddard	Louisville.

For 1880-81.

President	C. N. Peirce	Philadelphia.
First Vice-President	W. C. Barrett	Buffalo.
Second Vice-President	Geo. J. Friedrichs	New Orleans.
Recording Secretary	Geo. H. Cushing	Chicago.
Corresponding Secretary	A. M. Dudley	Salem, Mass.
Treasurer	Wm. H. Goddard	Louisville.

Executive Committee.

J. N. Crouse, Chairman. C. S. Stockton, Secretary.

First Division—Committee of Arrangements.

Cook, Perry, and Moore.

Second Division—On Credentials and Auditing Committee.

Crouse, Stockton, and Keely.*

Third Division—On Volunteer Essays.

Peirce,* Morgan, and Black.*

Local Committee of Arrangements.

Perry, Northrop, and Mills.

* These go out August, 1881.

MINUTES OF TRANSACTIONS

OF THE

AMERICAN DENTAL ASSOCIATION.

SESSION OF 1880.

BY GEO. H. CUSHING.

FIRST DAY—MORNING SESSION.

THE AMERICAN DENTAL ASSOCIATION commenced its Twentieth Annual Session at Huntington Hall (Massachusetts Institute of Technology), Boston, Tuesday, August 3, 1880, at 11 o'clock A.M., the President, L. D. Shepard, in the chair.

The session was opened with prayer by the Rev. Dr. Studley.

The roll of qualified members was then called, and the following were found either to be present or to have forwarded their dues:

ALLPORT, W. W.	208 Wabash ave., Chicago.
ALLAN, CHAS. F.	Newburg, N. Y.
ATKINSON, W. H.	41 East Ninth st., New York.
ANDREWS, ROBERT R.	Cambridge, Mass.
* ALLEN, JOHN	314 Fifth ave., New York.
BAUER, JOSEPH	130 Esplanade st., New Orleans.
* BROWN, SENECA B.	Fort Wayne, Ind.
BUCKINGHAM, T. L.	1206 Vine st., Philadelphia.
BARRETT, W. C.	11 West Chippewa st., Buffalo, N. Y.
BROPHY, T. W.	125 State st., Chicago.
BRACKETT, C. A.	64 Touro st., Newport, R. I.
BECK, C. S.	Wilkesbarre, Penn.
BAKER, H. A.	99 Boylston st., Boston.
BROWNE, R. W.	New London, Conn.
BOGUE, E. A.	29 East Twentieth st., New York.
BARKER, WM.	283 Westminster st., Providence, R. I.

Those marked thus (*) were absent but sent their dues.

Buckland, A. W.	Woonsocket, R. I.
Buckland, L. L.	146 Westminster st., Providence, R. I.
Bronson, W. A.	8 East Thirty-fourth st., New York.
Bishop, H. F.	Worcester, Mass.
Barfield, S. B.	90 Mulberry st., Macon, Ga.
Blake, J. E.	Amesbury, Mass.
Bullock, Charles	Cambridgeport, Mass.
Brockway, A. H.	13 Greene ave., Brooklyn, N. Y.
Batchelder, J. H.	Salem, Mass.
Bonwill, W. G. A.	1719 Locust st., Philadelphia.
* Colton, A.	Hudson, N. Y.
Crouse, J. N.	734 Michigan ave., Chicago.
* Chaim, M. L.	30 Cooper Institute, New York.
Cushing, Geo. H.	34 Monroe st., Chicago.
Cook, Chas. D.	133 Pacific st., Brooklyn, N. Y.
Curtis, J. W.	Brunswick, Me.
Clement, C. W.	939 Elm st., Manchester, N. H.
Church, W. P.	260 Westminster st., Providence, R. I.
* Cowie, Henry	Detroit, Mich.
* Cleland, Jas.	Detroit, Mich.
Clapp, D. M.	196 Boylston st., Boston.
Codman, J. T.	347 Columbus ave., Boston.
Chandler, Thos. H.	Boston.
Clark, C. S.	Main st., Brattleboro, Vt.
Colgrove, W. H.	Johnstown, N. Y.
Coyle, J. H.	Jackson st., Thomasville, Ga.
Cook, J. O.	Waterbury, Conn.
Carroll, C. C.	Meadville, Penn.
Coburn, H. W.	Lowell, Mass.
* Dennis, S. W.	33 Kearney st., San Francisco, Cal.
Dickerman, D. S.	Taunton, Mass.
Dean, M. S.	34 Monroe st., Chicago.
Darby, E. T.	1513 Walnut st., Philadelphia.
Davis, E. B.	Concord, N. H.
Dudley, A. M.	223 Essex st., Salem, Mass.
Davenport, J. N.	Northampton, Mass.
Davenport, Isaac B.	Williamstown, Mass.
Essig, C. J.	1533 Locust st., Philadelphia.
French, C. S.	Quincy, Mass.
Francis, Chas. E.	33 West Forty-seventh st., New York.
Fillebrown, Thos.	Portland, Me.
Fundenberg, W. H.	323 Penn ave., Pittsburg, Penn.
Friedrichs, Geo. J.	155 St. Charles st., New Orleans.
Finley, M. F.	Ypsilanti, Mich.
Filbert, P. K.	Pottsville, Penn.
Field, Geo. L.	Detroit, Mich.
Flagg, Eben M.	54 Bible House, New York.

* Freeman, S. A.	Buffalo, N. Y.
Goddard, Wm. H.	Louisville, Ky.
* Gaylord, E. S.	New Haven, Conn.
Grant, Geo. F.	86 Pinckney st., Boston.
Harlan, A. W.	70 Dearborn st., Chicago.
Hill, J. L.	Gettysburg, Penn.
* How, W. Storer	Cincinnati, Ohio.
Harrington, D. G.	Boston.
Honsinger, E.	318 Park ave., Chicago.
Harris, O. F.	Worcester, Mass.
Hurlbut, J. S.	Springfield, Mass.
* Hoysradt, G. W.	Ithaca, N. Y.
* Hurtt, J. M.	Peoria, Ill.
Hurlbut, C. S.	Springfield, Mass.
* Ingersoll, L. C.	Keokuk, Iowa.
Ingalls, D. B.	Clinton, Mass.
Jones, W. H.	Northampton, Mass.
Kidder, J. H.	Lawrence, Mass.
Knapp, W. B.	Fort Wayne, Ind.
Klump, G. W.	Williamsport, Penn.
* Lathrop, Joseph	Detroit, Mich.
Leach, E. G.	422 Columbus ave., Boston.
Leavitt, W. P.	19 Tremont Row, Boston.
Lee, J. U.	Chattanooga, Tenn.
Lord, Benj.	New York.
* McNaughton, D. C.	Jersey City, N. J.
McManus, Jas.	Hartford, Conn.
McKellops, H. J.	St. Louis.
McCampbell, J. S.	Xenia, Ohio.
McDougall, S. J.	375 Columbus ave., Boston.
Morrison, W. N.	1337 Washington ave., St. Louis.
Mills, G. A.	169½ Columbia Heights, Brooklyn, N.Y.
Matteson, C. F.	3501 Cottage Grove ave., Chicago.
Marvin, C. A.	148 Clinton st., Brooklyn, N. Y
Moore, T. T.	Columbia, S. C.
Meriam, H. C.	257 Essex st., Salem, Mass
Morgan, W. H.	Nashville, Tenn.
Miller, Chas.	331 Madison ave., New York.
Marriner, J. Frank	Ottawa, Ill.
Northrop, A. L.	44 West Forty-sixth st., New York.
Niles, Ed. S.	146 Boylston st., Boston.
Osgood, Chas. H.	147 Tremont st., Boston.
Odell, F. M.	18 West Eleventh st., New York.
* Palmer, S. B.	39½ Warren st., Syracuse, N. Y.
Preble, M. B.	Auburn, Me.
Page, Edward	Charlestown District, Boston.
Page, W. E.	Charlestown District, Boston.

Priest, A. N.	Utica, N. Y.
Peirce, C. N.	1617 Green st., Philadelphia.
Perry, S. G.	10 East Thirty-fourth st., New York.
Post, O. R.	Brattleboro', Vt.
Rideout, Leon	Lynn, Mass.
Roberts, E. J.	75 State st., Augusta, Me.
* Rhone, J. W.	Bellefonte, Penn.
* Rehwinkel, F. H.	Chillicothe, Ohio.
Shepard, L. D.	100 Boylston st., Boston.
Stockton, C. S.	Newark, N. J.
Smith, J. H.	New Haven, Conn.
Stoddard, G. W.	Belfast, Me.
Smith, H. A.	Cincinnati, Ohio.
Stevens, S. G.	Lynn, Mass.
Stearns, S. F.	Boston.
Stockwell, C. T.	327 Main st., Springfield, Mass.
Smith, H. Eugene	100 Boylston st., Boston.
Salmon, Ira A.	Boston.
Shumway, T. D.	Plymouth, Mass.
* Smith, D. D.	1417 Walnut st., Philadelphia.
Searle, Flavius	Springfield, Mass.
Seabury, F. N.	Providence, R. I.
Stewart, S. D.	Akron, Ohio.
Sherman, J. M.	Waltham, Mass.
Scarborough, J. W.	New Hope, Penn.
Taft, J.	Cincinnati, Ohio.
Templeton, J. G.	Pittsburg, Penn.
Thomas, G. R.	Detroit, Mich.
Taylor, L. C.	57 Church st., Hartford, Conn.
Talbot, E. S.	125 State st., Chicago.
Trueman, Wm. H.	900 Spruce st., Philadelphia.
Tenney, A. W.	Stoneham, Mass.
Wetherbee, I. J.	Boston.
Wilson, Geo. H.	Painesville, Ohio.
Waters, Geo. F.	8 Beacon st., Boston.
Webb, M. H.	Lancaster, Penn.
Werner, J. G. W.	41 Upton st., Boston.
Whitten, Dan'l F.	South Boston.
Walker, A. C.	Montgomery, Ala.
Watling, J. A.	Ypsilanti, Mich.
Watkins, S. C. G.	Montclair, N. J.
Wilson, C. P.	Boston.
Young, G. A.	Concord, N. H.

The following sent their dues for the years set opposite their names:

C. A. Kitchen, Rockford, Ill.	1879

EDMUND NOYES, Chicago	1879
W. E. MAGILL, Erie, Penn.	1878–79
D. E. KELLY, Ashtabula, Ohio	1879

The President then addressed the Association in a few appropriate remarks.

A verbal report was made by the Executive Committee, who presented the printed programme. This was adopted.

An invitation was extended to the Association, from the dentists and dental goods dealers of Boston, to a drive through the suburbs on Wednesday.

Also one from the Mayor and city authorities of Boston to an excursion by steamer down the bay on Thursday.

On motion of Dr. McKellops the invitations were accepted.

The Publication Committee submitted the following report, which was adopted:

The Publication Committee respectfully submit the following report:

They have published three hundred copies of the Transactions for 1879, which have been distributed to all active members whom the Treasurer's list designated as entitled to receive them; also to honorary members, to all the dental journals in the world, so far as known to the committee, and to various libraries.

There are on hand about one hundred and twenty-five copies.

The following is a statement of their account with the Association:

AMERICAN DENTAL ASSOCIATION TO THE PUBLICATION COMMITTEE.

Dr.

To publication of 300 copies of Transactions of 1879		$196 75
" Engraving and electrotype		8 00
" Postage, express charges, etc		30 10
		$234 85

Cr.

By cash from Treasurer	$271 00	
" " sale of Transactions	7 00	
		278 00
Balance due the Association		$43 15

The committee wish to state that the Transactions might have been ready for distribution in ninety days from the date of adjournment, had they felt at liberty to proceed at once with the work; but the treasury was empty, and it was not deemed justifiable to commence printing until enough money was collected to insure the payment of the bills. So soon as the proper amount was secured, they

proceeded with all the expedition possible, compatible with the proper execution of their task.

GEO. H. CUSHING, *Chairman.*

We have examined the above report and found it correct.

J. N. CROUSE, C. S. STOCKTON, } *Ex. Com.*

The Treasurer offered the following report, which was adopted:

WM. H. GODDARD, TREAS., IN ACCOUNT WITH AM. DENTAL ASSOCIATION.

1879.		*Dr.*	
August.	To balance	$31 21	
	" cash from assessment	208 00	
	" " dues	660 00	
		Contra Cr.	
August.	Paid voucher No. 1.—Programmes		$7 00
	" " 2.—Seal		8 00
	" " 3.—Ch'n Publication Com., 1878		146 66
	" " 4.—Salary Secretary		100 00
	" " 5.— " Treasurer		100 00
	" " 6.—Reporter		125 00
	" " 7.—Ch'n Com. of Arrangements		77 50
1880.	" " 8.—Stamps, Incidentals, etc		10 20
May,	" " 9.—Ch'n Publication Com., 1879		141 00
	Balance		83 85
		$899 21	$899 21

WM. H. GODDARD, *Treas.*

BOSTON, MASS., August 3, 1880.

BOSTON, MASS., August 3, 1880.

We have examined the above report and found the account correct.

J. N. CROUSE, C. S. STOCKTON, } *Auditing Committee.*

The following amendment to the constitution, offered last year, was then considered:

Under the head of "Instructions to the Publication Committee," insert, after the words "still on hand,"—

Any report or other paper to be entitled to publication in the volume of the Transactions for the year in which it shall be presented to the Association must be placed in the hands of the Publication Committee on or before the first day of September, and must also be so prepared that the proof-sheets furnished the authors shall be returned to the committee without material alteration or addition.

Every paper received by this Association and all plates or other means of illustration shall be considered the exclusive property of the Association, and shall be published for its exclusive benefit.

On motion of Dr. Buckingham, this was verbally amended by striking out the word "exclusive" before the word benefit.

As amended, it was then unanimously adopted.

The following amendments to the constitution, offered last year by Dr. Spaulding, were then adopted:

To amend third division of Section 6 of Article V. by striking out the words "Nominations and."

Also to amend the next paragraph of the same section so that it shall read as follows:

The President shall appoint two members of this Association, who shall act in conjunction with the Recording Secretary as the Publication Committee.

The following, offered last year by Dr. Beck, was then adopted:

To amend Section 2 of Article III. of the constitution by adding the words "or suspended" after the word "expelled."

The Committee on Credentials then made a partial report, which by subsequent reports was completed, as follows:

American Academy of Dental Science—S. F. Stearns, H. Eugene Smith, C. P. Wilson, F. N. Seabury.
Alabama Dental Association—A. C. Walker.
Boston Dental College—Isaac J. Wetherbee.
Brooklyn Dental Society—C. D. Cook, W. H. Atkinson.
Chicago Dental Society—A. W. Harlan, M. S. Dean, J. N. Crouse.
Connecticut Valley Dental Society—R. W. Browne, L. C. Taylor, W. H. Jones, C. S. Clark, C. T. Stockwell, J. S. Hurlbut, O. R. Post, J. O. Cook, J. N. Davenport, Isaac B. Davenport.
Dental Society of the State of New York—C. A. Marvin.
Dental Department of Vanderbilt University—William H. Morgan.
East Tennessee Dental Association—J. U. Lee.
First District Dental Society of New York—S. G. Perry, A. L. Northrop.
Fourth District Dental Society of New York—W. H. Colgrove.
Georgia State Dental Society—J. H. Coyle, S. B. Barfield.
Harvard Odontological Society of Boston—Daniel F. Whitten, Edward S. Niles.
Harvard Dental School—Thomas H. Chandler.
Illinois State Dental Society—George H. Cushing, J. Frank Marriner, C. F. Matteson, E. S. Talbot, T. W. Brophy, E. Honsinger.

Indiana State Dental Society—W. B. Knapp.
Kentucky State Dental Association—W. H. Goddard.
Lebanon Valley Dental Association—P. K. Filbert.
Massachusetts Dental Society—C. H. Osgood, Edward Page, George F. Grant, D. G. Harrington, J. M. Sherman, H. A. Baker, H. C. Meriam, E. G. Leach, I. A. Salmon, Dwight M. Clapp, O. F. Harris, J. T. Codman, Wm. P. Leavitt, O. Howe, H. F. Bishop, C. S. Hurlbut.
Maine Dental Society—M. B. Preble, G. W. Stoddard, J. W. Curtis, E. J. Roberts.
Merrimack Valley Dental Society—S. J. McDougall, C. W. Clement, D. B. Ingalls, S. G. Stevens, Leon Rideout, R. R. Andrews, G. A. Young, C. S. French, A. W. Tenney, T. D. Shumway, Charles Bullock, A. M. Dudley, H. W. Coburn, J. H. Kidder.
Missouri State Dental Association—H. J. McKellops, W. N. Morrison.
Mississippi Valley Association of Dental Surgeons—J. S. McCampbell.
New Jersey State Dental Society—C. S. Stockton, J. W. Searborough, S. C. G. Watkins.
New Orleans Dental Association—Joseph Bauer, G. J. Friedrichs.
New York Odontological Society—Benjamin Lord, Charles Miller, A. H. Brockway.
New Hampshire Dental Society—E. B. Davis, J. E. Blake.
Northern Ohio Dental Association—George H. Wilson.
Odontological Society of Pennsylvania—W. G. A. Bonwill.
Pennsylvania State Dental Society—M. H. Webb, C. J. Essig, E. T. Darby.
Pennsylvania Association of Dental Surgeons—C. N. Peirce, W. H. Trueman.
Pittsburg Dental Association—W. H. Fundenberg, J. G. Templeton.
Rhode Island Dental Society—Wm. Barker, Wm. P. Church, A. W. Buckland, L. L. Buckland.
Second District Dental Society of New York—C. F. Allan.
Susquehanna Dental Association—C. S. Beck, G. W. Klump.

The Secretary read a letter from Dr. J. J. Birge, of San Francisco, in which he expressed a desire to be reinstated as a member of the Association upon paying the dues for the time elapsed since his resignation.

After due consideration, on motion of Dr. Bogue, seconded by Dr. Marvin, the Secretary was instructed to reply to the letter of Dr. Birge, and to express to him that while the Association gratefully appreciated his generous proposition, and were unanimous in their desire to comply with his wishes, they found it impossible to do so under the provisions of the constitution, but hoped he would again connect himself with the Association through the usual channel.

Dr. Fillebrown offered the following:

Voted, as the opinion of this Association, that unless a member of this Association has a vote of expulsion or suspension passed by his local society, the 2d Section of Article III. of the constitution does not apply to deprive him of membership in this body.

Dr. Morgan made a point of order that such a motion was out of order, as directly modifying a provision of the constitution.

The Chair ruled the point of order well taken.

An appeal was taken from the decision of the Chair, but by vote the decision was sustained.

On motion, adjourned.

FIRST DAY—EVENING SESSION.

The Association met at 8 o'clock, the President in the chair.

The minutes of the morning session were read, amended, and approved.

A letter of resignation from Dr. R. Finley Hunt was read by the Secretary. On motion, his resignation was accepted.

Miscellaneous business being in order, the following report of the committee appointed to confer with committees from other societies regarding consolidation was read by Dr. Harlan, the chairman:

The committee to whom was referred the matter of conferring with representatives of the American Dental Convention and the National Dental Association relative to uniting the three associations would respectfully submit the following report:

After fully discussing the question of the need of the profession being united in one representative body, and conferring with the other committees on this subject, your committee are of the opinion that it would not be wise nor expedient, nor would it materially contribute to that end, for this Association to disband, or in any manner assist in the formation of a new organization. Your committee desire nothing more than that the whole profession should be united under one banner, but they are unable to see in what manner this object can be attained, unless the members of the profession throughout the country come to this Association with properly authenticated credentials from their State or local societies.

In this way no section of the country is denied the privilege of being represented in a truly national body.

Your committee, therefore, believing that the American Dental Association

possesses all the requisite qualifications of a truly national body, would respectfully recommend that it take no action which would in any way tend to impair its usefulness or terminate its existence.

(Signed) A. W. Harlan, *Chairman*,
F. H. Rehwinkel,
C. N. Peirce,
H. J. McKellops.

On motion of Dr. Webb, the courtesies of the floor were extended to Dr. George W. Field, of London, England.

Sections 2, 3, 4, and 5 were called, but none of them were ready to report.

Section 6 being called, Dr. Morrison made a brief report of cases in practice.

Dr. C. A. Brackett then read a report on "Certain Therapeutic Agents."

Dr. Odell, the chairman, followed with a report on "'Taking Cold' and Hyperæmia."

The subjects were discussed by Drs. Andrews, of Cambridge, Bogue, Buckingham, and Meriam, of Salem.

On motion, adjourned.

SECOND DAY—MORNING SESSION.

The Association met at 10.30 A.M., President Shepard in the chair.

The minutes of the evening session were read and approved.

Miscellaneous business being in order, the following report of the Committee on Directory was read by Dr. Stockton:

REPORT OF COMMITTEE ON DIRECTORY.

As chairman of the Committee on Dental Directory, appointed by you at the last meeting, I beg to report as follows:

Early in the winter circulars were sent to the different members of the committee, and the work received the hearty indorsement of nearly all the members. Later another circular was sent, with the intention of making the work more uniform. That, however, cannot very well be done without the aid of the various State and local societies throughout the country. On the 6th inst., I

mailed a postal card to the different members of the committee, asking for information in regard to the progress of the work. The answers received were a great surprise to me. With scarcely an exception, the work was well under way; quite a number of the lists were completed; the societies had indorsed the project, and will undoubtedly make provision for having them published, so as to be made available to all the dentists throughout the country.

The following lists have been received by me up to date:

District of Columbia, reported by Dr. R. Finley Hunt.
Indiana, reported by Dr. S. B. Brown.
Texas, reported by Dr. J. B. Tullis.
Kansas, reported by Dr. R. I. Pearson.
Missouri, reported by Dr. J. G. Harper.
Nevada, reported by Dr. W. O. Conwell.
Territories, reported by Dr. E. T. Darby.
New Jersey, reported by Dr. D. C. McNaughton.

This list will receive further and important additions when the Association meets at Boston, as the following gentlemen have notified me that they are ready or nearly so:

Louisiana, by Dr. George J. Friedrichs.
Virginia, by Dr. J. Hall Moore.
Kentucky, by Dr. A. D. Rawls.
Massachusetts, Vermont, and New Hampshire, by Dr. W. E. Page.
Rhode Island, by Dr. C. A. Brackett.
Maryland, by Dr. F. J. S. Gorgas.
Maine, by Dr. Thomas Fillebrown.
South Carolina, by Dr. T. T. Moore.
Illinois, by Dr. A. W. Harlan.
Wisconsin, by Dr. A. Holbrook.
New York, by Dr. S. A. Freeman.
Arkansas, by Dr. H. C. Howard.
Other States will undoubtedly respond.

For the State of New Jersey I would like to make a special report. At the last meeting of the State society, a resolution was adopted giving to each member of the society a copy of the list of Dentists in the State, also directing the committee to send a copy to each of the State societies, to the American Dental Association, American Dental Convention, Southern Dental Association, and to any other general organization that may hereafter be formed in this country. Also to sell to manufacturers of and dealers in dental goods copies of the directory at the rate of two cents per name, and at the same rate for all corrections hereafter. Another resolution was adopted calling for the appointment of dentists, residing at or near the county-seats, to advise the secretary of the society of the registering of any dentists at the county clerk's office. (The amendment to the law governing the practice of dentistry in New Jersey requires such registration.)

It will be seen by the foregoing that the list of dentists in New Jersey must, with very little care and trouble, be made nearly perfect each year.

Such a list must be valuable to the profession in a variety of ways. The dif-

ferent States are making laws for controlling and protecting the practice of dentistry, and, as a matter of record, the lists will be of great importance. Individual dentists throughout the country are continually making improvements, and to bring them before the profession in an inexpensive way, so that both buyer and seller will be benefited, is one of the reasons why I have advocated this work. Many dentists have improvements that are valuable, who will not have them patented, and who can make use of this directory to bring them to the notice of the profession.

I cannot too strongly call the attention of the members of State societies to the necessity of having their rules amended, or resolutions introduced so as to have the lists corrected each year. The work will be very slight when divided among so many, whereas, if the work is not corrected each year, there will be but little value to it in a short space of time.

In some of the answers to the circulars that were sent out to the members of the committee, I noticed that the lists were made up from lists in the possession of dealers in dental goods. While acknowledging the kindness of such dealers, I must add, that the profession as a body should be the leader of the dealer, and not the dependant. I feel that I need not offer my regrets at not being able to present my report in person when I can be so much better represented by Dr. Stockton.

All of which is respectfully submitted.

D. C. McNaughton, *Chairman.*

On motion, the report was accepted as a report of progress and the committee continued.

Dr. McKellops offered the following resolutions, which, after discussion by Drs. Atkinson, Darby, Morgan, Allport, Barrett, Mills, Buckingham, Shepard, Essig, and McKellops, were adopted:

Whereas, It is desirable that the dental profession, as a body, should give countenance to no other material for filling teeth than the best, and should encourage the greatest attainable thoroughness in the treatment of diseased teeth; and

Whereas, Of late years, many different alloys for the compounding of amalgams have been presented to the profession for their adoption, and put upon the market by the manufacturers, warranted to resist chemical change and thermal influence; and

Whereas, Some few members of the profession have seen fit to engage in the manufacture of said alloys for the formation of amalgams, and have used their position as professors to promulgate the doctrine of the superiority of amalgam compounds over all other materials as a filling for the preservation of the teeth; and

Whereas, Other members of the profession, holding responsible positions in some of our best colleges, have permitted their names to appear, indorsing advertisements setting forth the many fine qualities and rare virtues of these compounds, thereby giving countenance of a scientific character to their sale and use, and thus misleading many members of the profession who are but slightly

acquainted with the principles involved in the choice of the best filling material, since such men very naturally look up to the professors in their scientific character as authority in all such matters; and

WHEREAS, There is a peculiar impropriety in professors lending their names to the advertisements of these or any other compounds, inasmuch as charlatans lose no opportunity to exhibit and parade the names of such professors before an ignorant community, in justification of their constant use of an inferior material for filling teeth. Now, therefore,

Be it resolved, That this Association discountenance, in a formal and emphatic manner, the pernicious practice of members of the profession, and more especially those holding high positions in our schools, who allow their names to appear in advertisements as indorsing either any special material or compound for filling teeth, or any therapeutic agent whatsoever.

The regular order being resumed, the discussion of papers read by Section 6 was participated in by Drs. Morgan, Salmon, Werner, Atkinson, and Mills.

Subject was passed.

On Section 4 being called, in the absence of Dr. Keely the chairman, Dr. Darby made a brief verbal report.

On motion of Dr. McKellops, Dr. Joshua Tucker, of Boston, was invited to address the Association on Operative Dentistry.

After the conclusion of Dr. Tucker's remarks, a paper by Dr. John J. R. Patrick, of Belleville, Illinois, on "Oral Electricity and the New Departure," was read by the Secretary.

Discussion followed, participated in by Drs. Atkinson, Buckingham, and Allport.

Adjourned.

SECOND DAY—EVENING SESSION.

The Association met at 8.45 P.M., President Shepard in the chair.

The minutes of the morning session were read and approved.

Miscellaneous business being in order, the Executive Committee reported that they had examined the report of the Publication Committee and found it correct.

The report was adopted.

The Executive Committee also reported that they had audited the Treasurer's report and found it correct.

This report was also adopted.

On motion of Dr. Mills, a committee of five was appointed to draft resolutions touching the death of S. S. White. The President subsequently announced the following as that committee: Drs. Atkinson, Peirce, Taft, Morgan, and Mills.

The regular order being resumed, Operative Dentistry was further discussed by Drs. Allport, Morgan, Fillebrown, Thomas, Taft, and Atkinson.

On motion, adjourned to 9 A.M. to-morrow.

THIRD DAY—MORNING SESSION.

The Association met at 9.15 A.M. President Shepard in the chair.

The minutes of the evening session were read, corrected, and approved.

Miscellaneous business being in order, on motion of Dr. Essig, a vote of thanks was tendered to the dentists and dealers in dental goods, of Boston, for the entertainment of Wednesday afternoon.

The regular order being resumed, the discussion of Operative Dentistry was continued by Drs. Friedrichs, Lord, Stockton, Cook, Allport, Webb, Wetherbee, Mills, Niles, Waters, and Wilson.

Dr. Talbot, of Chicago, presented to the Association a set of instruments of his devising, intended for enlarging the canals of the inferior molars.

On motion of Dr. Atkinson, the Association accepted with thanks Dr. Talbot's gift.

Section 5 being called, a paper was read by Dr. Barrett, of the Section, on "Anæsthesia."

The rules were then suspended in order to call the roll for verification.

The regular order being resumed, Dr. Barrett's paper was discussed by Drs. Werner, Atkinson, and Shumway.

On motion, the rules were suspended and miscellaneous business introduced.

On motion, it was resolved to change the order of business for this evening so that the election of officers shall follow the organization of sections to-morrow morning.

On motion, adjourned.

THIRD DAY—EVENING SESSION.

The Association met at 8 P.M. The President, Dr. Shepard, in the chair.

The minutes of the morning session were read and approved.

Miscellaneous business being in order, a communication was read from the Secretary of the Art Museum very politely offering the freedom of the Museum to the members of the Association.

On motion of Dr. J. H. Smith, of New Haven, a committee of three was appointed to draft resolutions respecting the death of Dr. H. L. Sage, of Bridgeport, Connecticut. The Chair subsequently announced the following as that committee: Drs. J. H. Smith, W. H. Jones, and James McManus.

On motion of Dr. Taft the following was adopted:

Resolved, That a committee of five be appointed to take into consideration the feasibility of holding an International Dental Congress.

The following resolution was offered by Drs. Atkinson and Crouse:

Resolved, That the Publication Committee be instructed to confer with publishers to secure the best terms for the publication of the Transactions of this body, with authority to give such portion of the matter as the publishers may wish, as a part or as a full compensation, and that the Publication Committee have discretionary power to accept or reject any or all offers.

This was laid on the table till to-morrow morning.

Moved by Dr. Thomas, that the resolution, under the operation of

which a salary of one hundred dollars each is paid annually to the Treasurer and Secretary, be and is hereby rescinded, from and after this meeting. Lost.

The regular order of business being resumed, the further discussion of Dr. Barrett's paper was continued by Drs. Barrett, Brophy, Wilson, Buckingham, and Werner.

On motion, the regular order of business was suspended to hear a paper on Ethics by Dr. Marvin.

On motion, it was agreed to hear the report of Section 3 on Nomenclature and Terminology, which was read by Dr. Atkinson, the chairman.

Adjourned to 9 o'clock to-morrow.

FOURTH DAY—MORNING SESSION.

The Association met at 9.45 A.M. President Shepard in the chair.

Minutes of the evening session were read and approved.

Miscellaneous business being in order, the resolution of Drs. Atkinson and Crouse was taken from the table and adopted.

The regular order being resumed, Section 2 was called and a report on Education was read by Dr. Crouse, the chairman.

The following resolution, as recommended by the Section, was then adopted:

Resolved, That in order to secure representation in this Association, dental colleges must, subsequent to October 1, 1881, require all students entering therein to take two full courses of lectures previous to coming forward for examination and graduation, and must also state these conditions in their next annual announcement.

Dr. Brophy then read a supplemental report, and Dr. Fillebrown read one by Dr. Ingersoll.

These were discussed by Drs. Allport, Morgan, Buckingham. Stockton, Moore, Templeton, Barrett, and Wetherbee.

On motion, the subject was passed and the rules suspended to enable the sections to reorganize, which they did with the following result:

SECTION 1. Artificial Dentistry, Chemistry, and Metallurgy.—C. S. Stockton, Chairman; C. C. Carroll, George F. Grant, H. A. Baker, W. H. Fundenberg, Eben M. Flagg, D. G. Harrington, E. Honsinger, R. G. Richter, S. A. Freeman, E. S. Gaylord, William H. Trueman, J. E. Blake, John Allen, William Barker, Joseph Bauer, Seneca B. Brown, T. L. Buckingham, J. W. Curtis, C. W. Clement, W. P. Church, Henry Cowie, J. Cleland, C. S. Clark, J. O. Cook, H. W. Coburn, C. S. French, P. K. Filbert, J. L. Hill, W. Storer How, O. F. Harris, C. S. Hurlbut, W. H. Jones, J. U. Lee, M. B. Preble, Edward Page, E. J. Roberts, D. D. Smith, J. M. Sherman, J. W. Scarborough, A. C. Walker, J. A. Watling, G. A. Young, C. H. Biddle, H. H. Jackson, D. C. Kelly, A. E. Lyman, W. E. Magill, Charles Merritt, E. Osmond, F. A. Hunter.

SECTION 2. Dental Education.—Thomas Fillebrown, Chairman; J. N. Crouse, C. N. Peirce, Thomas H. Chandler, Charles D. Cook, H. A. Smith, S. J. McDougall, G. A. Mills, J. G. Templeton, T. W. Brophy, E. S. Talbot, Thomas T. Moore, W. W. Allport, E. A. Bogue, J. H. Smith, Thomas C. Stellwagen, W. H. Morgan, C. J. Essig, L. D. Shepard, R. W. Browne, G. W. Klump, C. W. Spalding, L. L. Buckland, E. S. Holmes, J. M. Hurtt, L. C. Ingersoll, D. C. McNaughton, C. A. Kitchen, C. A. Kingsbury, E. Noyes.

SECTION 3. Dental Literature and Nomenclature.—W. H. Atkinson, Chairman; J. Taft, W. A. Bronson, H. F. Bishop, Charles Bullock, J. H. Batchelder, A. Colton, Charles E. Francis, W. B. Knapp, Joseph Lathrop, A. L. Northrop, L. C. Taylor, S. M. Cummins, W. S. Moores, J. S. McMillen.

SECTION 4. Operative Dentistry.—M. H. Webb, Chairman; A. H. Brockway, J. W. Rhone, Charles H. Osgood, I. J. Wetherbee, W. E. Page, E. T. Darby, S. C. G. Watkins, J. S. McCampbell, H. J. McKellops, J. Frank Marriner, George L. Field, M. L. Chaim, W. H. Colgrove, Charles Miller, W. P. Leavitt, A. N. Priest, S. G. Perry, George J. Friedrichs, William H. Goddard, S. D. Stewart, J. H. Coyle, W. G. A. Bonwill, F. N. Seabury, D. F. Whitten, J. Searle Hurlbut, G. R. Thomas, Charles F. Allan, G. C. Daboll, O. R. Post, C. P. Wilson, D. B. Ingalls, T. D. Shumway, George H. Wilson, S. G. Stevens, G. W. Hoysradt, J. McManus, H. B. Noble, H. Eugene Smith, Dwight M. Clapp, A. W. Buckland, S. H. Guilford, C. A. Marvin, G. B. McDonald, John G. Harper, K. B. Davis, George W. Keely, S. B. Palmer, S. B. Barfield, Benjamin Lord, C. R. Butler, C. C. Chittenden, W. C. Dyer, William Dutch, Charles E. Dunn, A. F. Emminger, William Jarvie, Jr., Henry W. Morgan, H. L. Ambler.

SECTION 5. Anatomy, Physiology, Histology, Microscopy, and Etiology.—W. C. Barrett, Chairman; M. S. Dean, J. G. W. Werner, E. S. Niles, George F. Waters, Robert R. Andrews, C. T. Stockwell, George H. Cushing, Leon Rideout, E. Hunter, J. T. Codman, Isaac B. Davenport, S. W. Dennis, D. S. Dickerman, E. B. Davis, J. N. Davenport, E. G. Leach, G. W. Stoddard, S. F. Stearns, Ira A. Salmon, Frank Abbott, G. V. Black, C. F. W. Bödeeker, D. C. Hawxhurst, J. C. Hanks, J. Hooper, E. D. Swain, W. H. Allen, C. F. Wheeler.

SECTION 6. Pathology, Therapeutics, and Materia Medica.—Frank M. Odell,

Chairman; W. N. Morrison, A. M. Dudley, A. W. Harlan, C. A. Brackett, M. F Finley, C. S. Beck, A. W. Tenney, Gorton Nichols, I. Douglass, A. W. Freeman, Robert Huey, A. M. Holmes, E. S. Holmes, J. W. Hill, A. O. Rawls, F. J. Richards, Joshua Smith, J. S. Swartley, William Taft, George W. H. Whitaker, J. C. Whinery, I. P. Wilson.

The regular order being resumed, and Section 1 being called for, Dr. Stockton read a brief report, which was followed by a supplemental paper on Artificial Dentistry, by Dr. Eben M. Flagg, at the close of which, by motion, the Association proceeded to ballot for the next place of meeting.

New York City was selected.

Balloting for officers was then proceeded with, resulting in the election of the following:

President—C. N. Peirce, of Philadelphia.
First Vice-President—W. C. Barrett, of Buffalo.
Second Vice-President—George J. Friedrichs, of New Orleans.
Recording Secretary—George H. Cushing, of Chicago.
Corresponding Secretary—A. M. Dudley, of Salem, Mass.
Treasurer—Wm. H. Goddard, of Louisville.
Executive Committee—W. H. Morgan, of Nashville; S. G. Perry, of New York City; T. T. Moore, of Columbia, South Carolina.

The following resolutions offered by Dr. Peirce were adopted:

Resolved, That the Treasurer be instructed to pay all properly-authenticated bills.

Resolved, That a vote of thanks be tendered to the Local Committee for its very admirable arrangements, which have so largely contributed to our comfort and enjoyment during this session of the Association. Also to the reporters of the public press for their excellent reports, and to the proprietors of Hotel Brunswick for their liberal arrangement and superior accommodations.

On motion of Dr. Cushing, it was resolved that the Association desires to gratefully express its appreciation of the courtesies of the city of Boston, as extended to it in the sail through the harbor, and to the Mayor for his graceful attentions upon that occasion.

On motion of Dr. Taft, it was resolved that the hearty thanks of this Association be extended to its retiring officers for the very efficient and satisfactory manner in which they have performed their arduous duties.

On motion of Dr. Cushing, the special thanks of the Association

were tendered to the authorities of the Massachusetts Institute of Technology for their very generous gift of the use of their building for its benefit, whereby it has enjoyed unusually good accommodations.

On motion of Dr. Klump, a vote of thanks was extended to the retiring President for his untiring and successful personal efforts to make our stay here pleasant and long to be remembered.

A vote of thanks to the officers of the Art Museum for their courtesy was also passed.

The President announced as the Committee on International Congress, Drs. Taft, Peirce, Cushing, Bronson, and McKellops.

On motion, Dr. Shepard was added to the committee, and on motion of Dr. Taft, Dr. McManus was also added to it.

Resolutions regarding the death of Dr. H. L. Sage were presented by the committee to whom the matter had been referred, and were unanimously adopted. They will be found in the memorial pages.

The committee appointed to draft resolutions touching the death of Dr. Samuel S. White made their report. Appropriate remarks were made by Drs. Morgan and Barrett, after which the report was unanimously adopted by a rising vote. The report and remarks will be found in the memorial pages.

On motion of Dr. Crouse, the newly-elected officers were installed.

The Chair appointed Drs. Atkinson and Taft to conduct the President to the chair.

The retiring President introduced Dr. Peirce with brief and appropriate words, which were in like manner responded to.

The President appointed as the Local Committee of Arrangements Drs. Perry, Northrop, and Mills.

Also, as members of the Publication Committee, Drs. Darby and Dean.

The following notices of amendments to the constitution were presented:

By Dr. Priest.

To add to Section 5, Article III., of the constitution, under the head of "Permanent Members," that after the resignation of a member has been accepted, the Association may at any time thereafter reinstate such member by unanimous consent.

By Dr. Dean.

To amend Section 1, Article VI., of the constitution so that the first sentence shall read, "To prepare, arrange, and expedite business, this Association shall be divided into *seven* sections, as follows:"

And to change Section 5 to Anatomy, Histology, and Microscopy.

And to add Section 7,—Physiology and Etiology.

The minutes were then read and approved, and the Association adjourned to meet in New York on the first Tuesday in August, 1881.

In Memoriam.

DR. SAMUEL STOCKTON WHITE.

He is not here in bodily presence, but he is here in the spirit and effect of the work he accomplished here in the flesh. We miss him for the first time at this our annual coming together in sweet accord of fellowship. It is therefore fitting that we should record here and now a sense of *our great loss* inflicted upon us by his advancement to better spheres and higher activities. He was with us from the beginning of our organization, THE man of most potency in holding us together for the good of the whole, by kindly consideration and justice of treatment of each individual as necessary to the efficiency of all in the exercise of the duty of each to other. He was a man of quick apprehension, quiet demeanor, and of moral grandeur excelled by none.

It is but recording the sentiments he entertained to say that the excellency he maintained among us was the result of the daily consciousness of an OVER-RULING POWER among men, obedience to whose behests ever brings the highest success in all the activities of earthly existence. He was our best example of the comprehension and practice of "The Gospel of Commerce."

Overworked in mind, body, and affections, he has been cut off in the midst of a pre-eminently useful career, and we submit to that dispensation that we have not the strength to acquiesce in, of which strength he was so full by reason of his devotion of all his energies to his ideal source of all POWER.

Resolved, That a memorial page in our Transactions be set apart for this.

Dr. Morgan: It is proper on occasions like this that we should halt in the busy whirl of life and pay a tribute of respect to the memory of him who has gone from among us to return no more, and to take to our hearts anew the truth, the solemn truth, of the mortality of our bodies.

Samuel Stockton White was a prince among men; but he is gone, and we shall never again clasp his generous hand or meet his kindly greeting in our annual convocations. No one was more thoroughly identified with this Association, or more ardently desired its success than he; and now that we shall never again listen to his wise and

friendly counsel, we realize that indeed a prince in our Israel has fallen.

My business acquaintance with him commenced in 1847, my personal acquaintance and friendship in 1858, when I first met him. I think I came to know him thoroughly, and I honored and loved him well.

Dr. White's most striking traits of character were founded upon and grew out of his abiding faith in the wisdom and goodness of an overruling power. Deep down in his nature he had an unwavering trust (as he expressed it to me) in, and daily communion with, a Heavenly Father.

In early life he studied and practiced dentistry, and he became more and more thoroughly identified with it both as a science and an art, while life lasted. After he ceased to practice and embarked in business, he contributed to its wonderful progress more than any man of his day or time, especially in the way of improving and furnishing improved materials and fixtures for its practical details. His love of dentistry as a profession was exhibited to some extent in the many large and generous sacrifices he made to promote its interests; often at a heavy outlay of money, known only to a few of his personal friends, he purchased patents and appliances and quietly laid them aside, because he knew they would not be a benefit, but an injury to the profession, if made and sold. In this and other ways he spent thousands of dollars, of which he rarely spoke, and then only to intimate friends.

He possessed a self-command, I think, superior to that of any man I have ever known. When bitterly and unjustly assailed once, in my presence, and it seemed that any man of proper self-respect would have resented it by violent means, he with dignity forbore, and when asked how he could stand that, he calmly replied, "That man does not know me; he is mistaken in my character, and I can afford to wait until he discovers his error." And the result vindicated his wisdom. Others might, and many would, under such provocation have taken vengeance into their own hands; but this man, in his moral grandeur, wrapping his mantle of greatness around himself, could say, "I can afford to wait!"

Let us cherish his virtues, imitate his noble example, that we may, as he did, have daily communion with our Heavenly Father while here on earth, and when we go hence, as go we must, we may, like him, have a home with the blessed and good.

Dr. Barrett: *Mr. President*,—I desire to express my hearty con-

eurrenee in the words of fitting eulogy so tenderly spoken by Dr. Morgan. A name exhaling sweeter fragranee was never left the legaey of family and friends; and if with us, who had but professional and business relations with S. S. White, that perfume lingers yet, and the air even now seems hallowed by an angel presence, how dear must be that memory to those who were bound to him by stronger ties and who walked eontinually in the light of his uprightness! If to us the remembranees of his presenee are stimuli to nobler lives, what must his example be to those who stood eontinually near his side! "The memory of the just is blessed."

DR. H. L. SAGE.

It having pleased an all-wise Providence to call from the scene of his earthly labors and usefulness our esteemed brother, Dr. H. L. Sage, of Bridgeport, Connecticut; therefore

Resolved, That with deep regret the American Dental Association has learned of his decease.

Resolved, That in the death of Dr. Sage the Association has sustained the loss of one of its most zealous members, and the community an excellent and useful citizen.

Resolved, That we accord to his memory a heartfelt tribute of respect, and tender to his surviving family our condolence and sympathy in their heavy bereavement.

Resolved, That the Secretary be requested to send a copy of these resolutions to the family of the deceased.

SECTION VI.

Pathology, Therapeutics, and Materia Medica.

Report by W. N. MORRISON, of the Section.

Cases of Diseased Antrum.

MR. H. (age 24, good health) came to me with a swollen cheek, attributing the cause to a tooth. The second molar had a medium size gold filling in the crown (anterior sulcus), upon removing which and drilling a short distance I discovered a live pulp. I covered it up again, gave the case a little more time to define itself, and on the next day the plug of mucus was started from the antral foramen by blowing the nose, and a considerable quantity of serum was discharged. The swelling subsided and the patient was well in a few days.

Another case, Mrs. B. (age about 40, delicate, nervous organization), complained of pain and soreness on the right side of the face and in the ear. The second superior molar was dead, and the pulp exposed in the third molar. I applied disinfecting dressings in the cavities for a day or two without benefit. On a second or third visit the patient said she had stooped to pick an article from the floor when she felt something give way in her nose, and quite a discharge, "about the consistence of machine oil," came away. This patient steadily improved.

Another case of long standing was where a right superior molar was extracted to relieve a similar swollen face, but without good results. After being treated by a general practitioner for nasal catarrh until his money was all exhausted, the patient was sent to a dentist to have another tooth extracted and his teeth generally looked after. The dentist found the antrum engorged with a semi-solid secretion which would not wash out, but had to be pumped out with a syringe, and coiled like a rope on the spittoon as it was discharged from the syringe. After evacuating the cavity and medicating with dilute carbolic acid, the patient was discharged cured. Treatment was made through the socket of the anterior buccal root of the molar extracted about three months before, and which had not

closed. The physician had not discovered anything wrong about the antrum, but had treated the patient for nasal catarrh.

It is this class of cases and others equally marked by abnormally enlarged cheek-bones that we should ourselves treat, or see that other specialists do examine that particular field of the mucous membrane. I recommend that the natural opening into the nares be enlarged and used where it is at all practicable in treatment. This offensive and distressing malady with which so many of our patients are afflicted (largely among the children) could be greatly relieved, and in many cases entirely cured, by a little dental assistance or friendly communication with a brother specialist.

SECTION VI.—Continued.

Report by C. A. BRACKETT, of the Section.

Certain Therapeutic Agents.

It has been well said that the work of this body should be mainly addressed to the discussion of broad general principles, and that matters of detail should be left to the smaller local societies. While fully appreciating the soundness of this proposition, I find it impossible to present what I wish to present without going somewhat into detail. I have also to apologize for the frequent use of the personal pronoun. The egotism manifested thereby is mainly seeming, for only a small part of the matter of this paper can be claimed as having been developed by my own investigations.

I will endeavor to be as concise as I consistently can in bringing before you a few points within the field of Section VI.

The first of these relates to the modification and control of the flow of saliva by medication, with a view to lessen the difficulties and annoyances of operations in very wet mouths. Physicians have long recognized certain effects following the exhibition of belladonna. The "United States Dispensatory," in the edition of 1874, and I think likely in earlier editions, has this statement concerning belladonna: "Among its first obvious effects, when taken in the usual dose and continued for some time, are dryness and stricture of the fauces and neighboring parts." The leading statement under the head of

"Medical Properties and Uses" is, "The action of belladonna is that of a powerful narcotic."

Dr. A. F. Angell, a practitioner of medicine and dentistry in Newport, R. I., presented the dental uses of belladonna to the Rhode Island Dental Society, at its annual meeting in July last. Dr. Angell claims that, reasoning from the facts just named and constantly verified in general practice, and stimulated by the necessities of a trying case then in hand, he originated, in the year 1870, the use of belladonna with the definite object of controlling the salivary secretions. He claims, further, that from that time to the present he has practiced its use in the class of cases in which it could render the greatest service, and always with the happiest results. It is claimed not only that the flow of saliva is almost completely controlled, but that nervous sedation very grateful to the patient is also induced.

To produce these effects in aid of the dentist the dose may be for an adult, of the fluid extract of the root, from five (5) to twelve (12) drops. This is the most concentrated liquid form of belladonna, and it will be well to keep in the neighborhood of the smaller quantity till familiarity with the drug and its effects is attained. Other preparations of belladonna may be used, if preferred, in quantities the equivalents of those named. For a child the dose should be proportionately reduced.

The second point to which I would ask your attention is the liability of producing injury to the teeth by the acid nature of oral medicaments which we may employ carelessly or thoughtlessly. My attention was called to this matter only a few days since by the following case: While engaged in cleansing the teeth of a gentleman whose mouth has for many years been in the care of one of the best practitioners in the country, I could not fail to notice a broad, ragged excavation in the enamel on the labial face of the right superior central incisor. It was developed that the gentleman had a few months previously been advised to make frequent applications of tannin to his diseased gums. This instruction he had followed more than faithfully, and he was positive that this excavation had taken place within the time in which he had been making use of the tannic acid. At various times during previous years I had operated in and examined the mouth of the patient, and this excavation had never been noted, as I am sure it would have been if present; nor have I ever seen in any other mouth an appearance like it. On testing with

litmus paper a specimen of tannic acid from my own case, I found the reaction so marked that the conclusion that it was the active agent in the etiology of the condition present seemed irresistible.

In "Magitot's Treatise on Dental Caries," translated by Professor Chandler, we read this "conclusion" as the result of several experiments extending over a period of two years: "Tannin is a special alterant for the ivory [*i.e.*, the dentine] and cement, its effects being probably produced by previous fermentation with fermentation of the derived acids; but its action, which is produced only at a considerable degree of concentration, need not, in our opinion, receive any very important application in the pathogeny of dental caries."

It should be stated, however, that the strongest solution of tannic acid used by Magitot in his experiments was one part to one hundred parts water. Sound teeth freely exposed to the action of that solution for two years at the ordinary temperature showed no appreciable alteration in the enamel, which was merely covered with a light deposit of a greenish coloring-material, but had kept its polish and its ordinary hardness. The roots showed a marked softening of their substance, which, at the same time, was stained a light-brown color, and could be penetrated by an excavator to some depth.

In the case of the patient of whom I speak the crystals of tannin were themselves applied to the teeth and gums.

Stimulated by the revelations in this case, I have made a series of tests of a few of the agencies we are using with more or less frequency in the mouth, and I will put the results before you. Of course the list contains many materials which we have probably all known to be acids. I think it contains a few that some of us would hardly have suspected of acidity to the degree which exists.

These strips of litmus paper were dipped respectively in the materials named and carefully dried before being placed in the neighborhood of each other. The appearances now are substantially the same as when the tests were made, except that from the exposure to the air for several days the untouched portions of the paper have lost something of the blue color. The mucilage with which the strips are fastened is also acid, as you will see. The water with which the fresh solutions were made was rain-water, and tests of it alone proved it free from acid.

It should be stated that the case of erosion named, and which was my stimulus to make this demonstration before you, was first brought to my attention only four days since. Hence my work has been hastily done, and is not so complete as I would desire.

[The writer of the report here exhibited strips of litmus paper that had been respectively treated with these substances, viz.:

Fresh saturated aqueous solution tannic acid.

Saturated aqueous solution alum (kept some months in stoppered bottle).

Fresh aqueous solution phosphoric acid.

Prof. Wetherbee's Dental Obtundent.

Fresh aqueous solution salicylic acid.

Ordinary alcoholic tincture myrrh (kept some months).

Mixture of glycerin two (2) parts, deliquesced chloride of zinc one (1) part.

Mixture of glycerin two (2) parts, tincture aconite root one (1) part.

Deliquesced chloride of zinc.

Liquid of Fletcher's Artificial Dentine.

Liquid of Smith's Oxychloride of Zinc.

Liquid of Agate Cement.

Liquid of Poulson's Cement.

Paste of Fletcher's Dental Porcelain.

These strips, except the one dipped in the liquid of Fletcher's Artificial Dentine, exhibited marked acid reactions in different shades of red color.]

Both tannic acid and alum are used so commonly and so freely in the mouth as astringents and styptics that the need of caution in regard to them is not imaginary. Alum is also an ingredient in some of the tooth-powders of questionable character.

It seems hardly necessary to say that all such dentifrices must exert a deleterious influence. I question, also, whether any preservative qualities of tannin in connection with carbolic acid and cotton as a canal filling, as recommended by one of our best operators, may not be more than counterbalanced by the acidity of the first-named substance.

Concerning alum, even in attenuated solutions, the conclusion of Magitot is, "Alum, a mineral substance slightly susceptible of fermentation, respects absolutely the dentine and cement of the teeth, and destroys with great energy the elements of the enamel."

Dr. Wetherbee's Obtundent gives a deeper red tinge to the litmus paper than does the simple solution of phosphoric acid. The solution used in the test was, however, not a strong one.

The acid reaction of tincture of myrrh is so much of a surprise to me that I doubt if all specimens would show the same; but none of that in my office gives any different result.

When salicylic acid was brought to a place in the dental materia medica, among the uses for which it was recommended, one was as a medication of cotton to be used for canal fillings. As such I tried it, and the results were gratifying, so far as the subsequent comfort of the tooth was concerned; but, having occasion for other reasons to remove two or three canal fillings of this kind, the evident rapid progress of white decay in the canals during the interval they had been so filled induced me to entirely renounce its use for that purpose. The practice of sealing in a tooth any substance which test-paper pronounces acid, and which has such affinity for tooth-structure as to be capable of disintegrating it, appears worthy of condemnation.

Specimens tested of glycerin, absolute alcohol, tincture of aconite root, and fresh aqueous solution of John Wyeth & Bros.' compressed tablets of chlorate of potash were found free from any acid reaction, but combinations may be acid though their component parts were not. The mixture of glycerin and tincture of aconite root shows about the same acid reaction as glycerin with chloride of zinc. Allusions to these combinations will be made again farther along in the report.

The most brilliant acid reactions are produced by chloride of zinc and the liquids of the various white cements. In combination, however, with the powder this acidity is supposed to be neutralized; and the results of their use certainly corroborate the theory. As was to be expected, the liquid of Fletcher's Artificial Dentine—the non-irritant pulp-capping—is only slightly acid. The specimen tested was not from a freshly-opened bottle.

These tests might be carried much further, doubtless with profit, if time and disposition permitted. Enough, however, has been said and shown to convey the point intended, viz., that many of the medicaments often used in the mouth by dentists are actively acid; and they should be applied with the intelligence, the care, and circumspection requisite when dealing with agencies of that class.

It is with hesitancy and diffidence that I approach the consideration of the third and last subject I have to place before you. This feeling arises from my own inability, in the nature of things, to decide conflicting claims and to do justice to each gentleman who has or has had connection with the matter. As the only New England member of Section VI., I feel it my duty to report something of the recent progress that has been made, and it seems worse than pla-

giarism to use the material kindly placed by my own request in my hands without giving credit therefor. I have given the matter much thought, and have tried to pursue the best course. I am well aware that there is much in my report that is not within the limits usually set for papers of this character, but unreservedly I affirm that I have no affecting personal preferences, or any object whatever, other than the presentation of such truth as I have been able to gather. At any point at which I may err, I trust to be set right.

It is in proof of the fact that our poor human nature is not absolutely depraved that long experience does not take from the good practitioner the feeling of shrinking from the infliction of pain. A very large part of what has been considered necessary pain in dentistry has come from the excavation of cavities. Hence have arisen the many attempts at prevention and alleviation which have been brought out in years past. These we have all tested without general and complete satisfaction. One of the simplest means, and perhaps the one to which resort has most universally been had, has been the exclusion of the oral fluids during the process of excavation, it having been plainly recognized that a dry cavity is less sensitive than a wet one. The reason for this, I suppose, is, as has been said, that in obtaining the dryness we are depriving the tissue of one of its natural elements, and hence its capacity for conveying impressions is curtailed. Until lately, little if anything has been suggested in the way of accomplishing this dryness other than mechanical means.

The newly-published idea in the treatment of sensitive dentine is that we should supplement the mechanical means of dryness with chemical means of dryness,—*i.e.*, we should use as obtundents materials which have such an affinity for water as to take it from the dentine. This is the broad general principle; the details may be worked out in various ways.

In practice it is found that materials which have this greedy affinity for water, when applied alone in sensitive cavities, themselves produce pain from the rapidity and force of their action; hence arises the necessity of making combinations, of using them in connection with such adjuvants and such corrigents as shall make their action substantially painless while still effectual.

Prominent among the substances which have this affinity for water and are in all respects harmless are glycerin and absolute alcohol. With one or the other of these is combined tannic acid, chloride of zinc, tincture of aconite root, etc.

So far as I know, the first formal public claim of having originated the idea which we are discussing, and having put in practice both the absolute alcohol and the glycerin, was made by Dr. T. D. Shumway, of Plymouth, Mass., in a paper read before the Massachusetts Dental Society at its last annual meeting, held in Boston on the 3d and 4th of June of this year.

As is well known to many of you, Dr. Shumway has for many years advocated the packing of cohesive gold with broad, smooth ivory points,—simply rubbing down, "ironing" down, one smooth layer of gold upon another,—the theory being that all that is necessary to accomplish the perfect welding of gold foil is that one smooth, clean, dry surface be placed against another smooth, clean, dry surface and gently pressed into perfect apposition. Practically, in the mouth, this requires great care to accomplish. Dr. Shumway's paper states that quite a number of years ago, in order to practice with the best success his peculiar method of manipulating gold, he found it very desirable to obtain greater dryness of the surface of dentine in cavities than the usual means of obtaining dryness could command. This increased dryness he found he could secure with absolute alcohol or with glycerin. From their use for this object he came to see their value as obtundents. He states that he has found one of the most satisfactory ways of using glycerin to be in combination with tincture of aconite root,—two (2) parts of the former to one (1) part of the latter.

Dr. Shumway's claim is that for more than seven (7) years he has steadily practiced the use of these means for lessening the sensitiveness of dentine, and that he was their original inventor in the way described. He claims, further, that the preparation known as "Näbolï" was developed from statements of his concerning his use of these materials, made directly and indirectly, to persons who have since become prominent in bringing out Näbolï.

Dr. C. G. Davis, of New Bedford, Mass., also claims to have discovered the more essential ingredients of Näbolï, and to have communicated the same to the President of the Dennett Dental Näbolï Co. Dr. Davis's statement, as made to the Massachusetts Dental Society at the meeting already named, is, in substance, that having an excruciatingly sensitive cavity to prepare some months previously, he tried the greater part of obtunding agents within his knowledge without appreciable benefit. In desperation, he took from his case a bottle whose contents had been procured for another purpose. Applying this material and waiting a little, he found to his surprise and

delight that the excavator could be used comparatively without pain.

Dr. S. J. McDougall, of Boston, writes: "I have found a preparation of the following, of value for obtunding sensitive dentine:

℞ Absolute alcohol, ℥ss;
Glycerin, ℥ss;
Tannic acid, ʒss.—M.

Also,

℞ Absolute alcohol, ℥ss;
Glycerin, ℥ss;
Chloride of zinc, ʒss.—M.

"In all cases where possible use the hot-air syringe. That—the hot-air syringe—I consider more valuable than all else combined. . . . Hence heat applied to the tooth is at the present time the *best* obtundent we have. . . ."

Dr. McDougall at different times supplied several other dentists with his combinations, without, however, revealing their ingredients then. Among the Boston dentists so supplied were Dr. H. E. Dennett and Dr. S. F. Ham, to each of whom was given the absolute alcohol, glycerin, and tannic acid preparation. This was as early as 1878. Concerning his claim for originality, Dr. McDougall makes this written statement over his signature, under date of July 29, 1880:

"I did, positively and absolutely, 'personally and independently' originate those combinations which I sent you for obtunding sensitive dentine."

The explanation of these apparently conflicting statements I believe to be that different men, working independently and each in his own way, arrived at similar results. It is very far from being the first instance in which substantially the same thing has had different discoverers. It is more than probable that others than those named have explored some part of the same field, but so far as I know the first open publication of these points was made at the time and place and by the gentlemen stated.

At the same meeting of the Massachusetts Dental Society, Professor I. J. Wetherbee, of Boston, by request, gave the formula of a combination which he has since placed in the market under the name of "Wetherbee's Dental Obtundent." The formula is:

℞ Concentrated solution phosphoric acid, ʒi;
Chloroform, ʒii;
High-proof alcohol, ʒvj to ʒviij;
Sulphate of morphia, gr. cxxv.

The ingredients to be added to each other and rubbed up in a mortar in the order named.

As has become quite generally known, there has been organized in New England within a few months a stock company claiming to be the owners of a valuable patent right for obtunding sensitive dentine. This company makes a business of selling the material, and granting, for a considerable sum per year, office-licenses to use the same. The way in which this company has come into existence, the nature of its claims, and its ability to substantiate them, are such that it has failed to secure the respect of the better portion of the profession who have acquired the most knowledge concerning it. Early in the summer Dr. A. M. Dudley, of Salem, Mass., spent considerable time and money in thoroughly investigating the character of The Dennett Dental Näbolï Company and the validity of its claims. The results of this investigation he laid before the Massachusetts State Society, and that body promptly, emphatically, and without a dissenting voice, passed resolutions adverse to the claims of the corporation. Among other matters presented by Dr. Dudley was the result of a chemical analysis of Näbolï made by Professor B. F. Davenport, of the Massachusetts College of Pharmacy. Näbolï is contained in a series of four bottles, with directions to apply from the contents of each to the cavity in the order of their numbers. In the specimen that he examined Professor Davenport found the contents of No. 1 to consist essentially of sweet oil; of No. 2, sweet oil with a little tannic acid; of No. 3, glycerin and much more tannic acid; of No. 4, chloroform. The contents of all the bottles were scented with attar of rose. I have also here a copy of an analysis made somewhat later for Dr. McDougall by Professor Babcock:

[COPY.]

10 ROLLINS ST., BOSTON, June 14, 1880.

DR. S. J. MCDOUGALL:

Dear Sir,—I have examined with considerable care the contents of four bottles contained in a small wooden package, and marked "Dennett's Dental Näbolï," the bottles being numbered No. 1, No. 2, No. 3, and No. 4, each bottle having the word "Näbolï" stamped in red wax upon the cork, and each having revenue stamps canceled by the letters "D. D. N. Co."

The results of my examination and analysis are as follows: No. 1 contains a preparation of petroleum oil, resembling "vaseline," perfumed, and incorporated with a very small quantity of tannic acid.

No. 2 is in all respects like No. 1, except that the proportion of tannic acid is somewhat greater. No. 3 consists of glycerin, perfumed, and holding in solution tannic acid, but in considerably greater proportion than either Nos. 1 or 2. No. 4 contains what is known as wood-naphtha, or methylic alcohol, a product of the distillation of wood, and holding in solution various empyreumatic impurities which give it its peculiar odor and acid reaction.

Respectfully, JAMES F. BABCOCK,
Analytical and Consulting Chemist.

A more recent analysis, made under more favorable circumstances, by Prof. Davenport, and verified by another Boston chemist of high standing, who, from motives of delicacy, asks that his name be withheld, makes this showing:

Bottle No. 1. A paraffine oil, with a trace of tannic acid.

No. 2. The same oil, with a larger proportion of tannic acid.

No. 3. Glycerin and tannic acid.

No. 4. Chloroform and alcohol.

All perfumed with attar of rose.

There is substantial agreement in the different analyses concerning the essential parts. Several facts should be stated in explanation of the minor discrepancies that appear. Some of the analyses have been made under peculiar difficulties. One of the earlier ones was made with only ten drops from each bottle. Further, it is hardly likely that all the Näbolï placed upon the market has been of strictly uniform composition.

In view of all that is now known concerning dental obtundents, the haste which some practitioners made to bind themselves under a multiplicity of conditions, and become licensees of a corporation with no better claims for exacting tribute than has this one, seems hardly wise. If successive experiences, such as we have had with patent rights and royalties, do not teach us to look before we leap, we must be blind indeed.

In regard to the merits of the different materials and combinations that have been named in this report, it can only be said that the tests so far have not been sufficiently general and extended to positively determine their value. It is hardly reasonable to expect anything magical or miraculous from any of them. My own experience, very limited yet, would lead me to say that if we do have such expectations we are doomed to disappointment. I believe that one favorable thing can be said of all of them. Properly used, with careful after-

neutralization and cleansing of the cavity, none of them are likely to do harm. They are as worthy of trial as anything within our present knowledge. Some of them may prove of real merit in alleviating the pain of our operations; and if so, patient and practitioner will alike rejoice.

SECTION VI.—Continued.

Report by FRANK M. ODELL, Chairman.

"*Taking Cold*," *and Hyperæmia.*

IN this report I propose to treat upon the subject of "Cold," as popularly applied in the sense of "taking cold," as the phrase runs.

This pathological manifestation is by many physicians considered to be merely the result of hyperæmic induction of nutritive and functional disorder, generally nominated "catarrh," and variously classified, according to the location of its most prominently active symptoms.

I think I may with confidence assert that its etiology is not yet sufficiently clearly understood to admit of either such prompt measures in therapy as shall invariably and at once abort its progress, or such others in prophylaxis as shall prevent its inception; much less such accuracy of prophasis as may surely predict its termination.

The predisposition to catarrh is varied by individual peculiarities of age, birth, occupation, sex, and all that these subdivisions may imply in development from infancy to old age; and consequently we often hear our medical attendants explaining (?) in answer to our question as to *cause*, "it is owing to increased susceptibility of the mucous membrane," or, "of the skin, to thermal changes:" all of which is an assumption of wisdom embodying nothing of explanation, although passing for a reply.

In terser parlance, diathesis and cachexia are the twin helmsmen who never forsake their post; and an acquaintance with the chart which they invariably spread will enable us to do much toward the safe piloting of our patients' "bark of life."

But to whatever causes we ascribe the catarrhal conditions which may present, the more immediately pressing symptom is always that of a hyperæmia, of territory more or less extensive.

Hyperæmic condition of territory is the resultant of neural inadequacy, permissive of undue acceleration of nutrient currents, followed by stasis, directly productive of suppression of normal, and therefore induction of abnormal, functional activity on the part of corpuscular or epithelial bodies.

This condition cannot be met by direct specifics; none such exist; but once the diagnosis being correctly made out, our sensible course is to so act upon the neural and vascular currents as to supply nutrient material to suffering elemental tissues or bodies; in other words, atony must be superseded by tonicity: some tissue is starving for lack of its proper pabulum, either *directly* withheld, or merely from inability to appropriate that for which it craves, but which nevertheless may, in an unavailable form, be present in abundance.

Tonicity may sometimes be regained by stimulant applications; at other times by reduction of vascular tension; and again by restoration (direct supply,—feeding) of elements, either positive or negative, indispensable to polarization (satisfaction) of molecular or atomic affinities.

Usually, the first departure from the regular nutrient or respiratory exchanges of elements in tissue would be in consequence of undue retardation or acceleration of currental movement, *autonomically corrected by the elemental bodies themselves.*

Therefore it is that congestion in capillaries is not always best met by direct applications of ice, nor that the algidity of one suffering from hæmaturia should call for *hot* applications. In the former instance, it is well understood that hot-moist external applications, by relieving the tension, first cuticular, then vascular, suffer the currents to resume their motion, and thereby normal status of all the involved tissues is the more readily resumed. In the latter instance, the gelid creature lying so helplessly, with stertorous breathing, and lips and tip of nose already shading heavily with blue, seems like anything else rather than a subject for applications of ice; yet ice above all things, applied immediately to the hypogastric region, and long continued, is, to her, life! whilst stimulants and heat would at once reinstitute the bleeding, and a moribund state would be reached in rapid metre.

So, likewise, in the treatment for catarrhs; it is well to scan all the history of each particular case before adopting any line of treatment. It is, too, imperative to remember the mutual relations of organs capable of exercising vicarious functions.

A knowledge of the physiology of catarrh teaches us that after

abnormal heat-loss the body has recovered its temperature with a *plus*, which has resulted in pyrexia; ordinarily defervescence follows, and the normal standard of temperature is reached and maintained. Therapeutically, we can hardly do better than to follow and assist these natural processes.

If consulted in the first stage, some hot fluids—alcoholic, if you please—and a full dose of paregoric or Dover's powder at bed-time, would be quite sufficient.

In the later stages, however, with dry, hot skin, and congested condition of epithelial lining of respiratory tract, perhaps with dyspnœa and cough, it is better to at once excite cutaneous action; so we give such medicament as shall set up a gentle action of the bowels, in counteraction of the natural tendency to constipation in such cases, and also a single large dose of compound powder of ipecac, to induce profuse diaphoresis; or the same action may be induced by a warm bath, followed by a plentiful hot drink of lemonade, with a wine-glassful of whisky or brandy therein, the alcohol here acting as one of the best of diaphoretics; and the liability to an accession to the catarrh on rising in the morning is overcome by a cold douche, quickly taken, and immediately followed by vigorous drying, and by another wine-glassful of alcoholic fluid well rubbed into the epidermis. Any bland oil or fat may be substituted, but I give preference to the alcohol.

Then to fortify the citadel against relapse, a course of iron and vegetable tonics, with a little oil of cod-livers, and good living (which includes all that can be said about regularity of habits and sufficiency of sleep), are measures not only advisable, but often simply indispensable to a complete recovery.

Because the systemic condition which *permitted* the aberrations of function resulting in the catarrh is generally but the natural sequence of privation of needed *exercise*, *sunlight*, *fresh air*, or *sleep*, or a combination of these hardships.

It may be objected that bathing with pure spirits or alcohol is unphilosophical and anti-physiological, because the skin is an *excreting* and *secreting*, and not an *absorbing*, surface.

To this I reply that this is a dilemma presenting not the traditional *two* horns, but *five;* each of which, however, is, like the "horns of the altar" in ancient Jewish history, a horn of safety.

They may be summed up under the following heads:

1st. Physical signs, or the evidence derived from ordinary observation and feeling.

2d. Chemical phenomena.
3d. Physiological aspect.
4th. Pathological view.
5th. Empirical demonstration.

From the first point of consideration—viz., physical signs—I take the old and familiar example of immersion of the body in fresh water, and its effect upon thirst. This is an exceedingly crude experiment, and the fact that no perceptible diminution of thirst should follow long continuance therein does not in the least militate against the proposition of absorption of fluids, because thirst results from the natural demand of *every* tissue of the organism, and of each and every living corpuscle thereof, requiring, as *a priori* may readily be predicted, more fluid than the most ardent advocate of dermal absorption would ever expect to introduce by that channel.

But let the bath be of water impregnated with salts of potash or soda, or with the latter and a trace of iodine as in sea-water, and upon attempting to dry the surface of the skin, it will be found that its furfuraceous layer has parted with much of its sebaceous lubricant and replaced it with water; nay, more, that this layer appears to have actually swelled and imprisoned a quantity of water between or within its folds or scales, and that a stimulant application, such as alcohol, is now felt, not only locally, but systemically; and aside from its action upon the immediate surface of contact, a decidedly tonic influence is exerted upon the whole epithelial surface, internal as well as external.

Further argument in support of this will be seen in my fifth postulate.

2d. *Chemical Phenomena.*—In this second aspect of the subject medical records prove that carbolic acid, when applied to the dermal surface, needs no previous preparation of the latter, in order to permit of its absorption. From its own affinity for fluid, and its corrosive action when applied to dermal surface, carbolic acid readily makes its way through the furfuraceous layer. Its continued action (which, if upon an extensive surface, would result disastrously if not interfered with) can be readily controlled by application of glycerin; and its subsequent elimination by the kidneys and other emunctories is proof of its having been absorbed.

Another instance of this chemico-physiological absorption—for the two actions run so into each other that the dividing-line is almost imperceptible—is found in the action of hydrocyanic acid, absorption.

of which is rapidly fatal, merely from *contact* with dermal surface, without mechanical friction.

From the third or physiological aspect it is easy to educe the feasibility of dermal absorption, because, with the exception of the furfuraceous layer, we have every element favorable.

First, we have a system of epithelial bodies surrounded and interlaced and overlaid with a complete network of capillaries, the circulation in which constitutes a most ready channel for absorption; and then we have, as the next most efficient factor in the process, a system of enveloping lymphatics, or intercapillary spaces or lacunæ, giving an independent and rapid transit for suitable fluids from the periphery toward the circulatory centre. Again, in the epidermis, which I have granted to be an impenetrable layer (as to absorption) to a certain extent, we have only to kick up a slight dust in the superposed or furfuraceous layer, so as to deposit among its scales some vaccine lymph, and presto! we have inoculated our patient with cow-pox.

4th. From a pathological view of the action of epithelial bodies, I have only to refer to the urinary vesicle, which, although generally permitting no absorption during life, is perfectly permeable after vitality has departed; so that by a parity of reasoning, whilst in a strictly physiological condition absorption might not take place by dermal epithelia, it would be quite possible and probable in *pathological* conditions. And this view is again sustained by the fact that the urinary bladder often permits of concentration of its contents, the dissolved matters remaining, whilst the purely watery portion is absorbed.

5th. *Empirical demonstration.*—The word "empiric" comes to us from the Greek, and signifies "a trial," and was the ancient honorable appellation indicative of those physicians who, rejecting theory, practiced only upon those principles sustained by experience alone. It is only by us moderns that the term has come to be used rather as one of reproach, but even when so used it is oftener merely with an *assumption* of superior knowledge than on account of any just ground for such a claim. In fact, I feel justified in asserting that empirical practice has always led the way for scientific research. Empiricism made assertions, and in part, at least, demonstrated them. Scientific investigators plodded along after, and gave the *reasons* for such results. It is simply another instance of man's dependence upon man, it being so ordained that no *one* is in himself complete.

So the Iatraleptes (immediate successors of Æsculapius) treated

all diseases by external means only—viz., by unguents, frictions, laying on of hands, etc., and from the days of Jesus Christ down to our own time much success has attended their efforts.

It is not therefore to be wondered at that modern physicians have made use of some of these means to ends; nor that the practice of greasing the throat and chest with goose-grease still obtains in cases of croup and diphtheria; nor that catharsis is obtained by means of croton-oil rubbed upon the abdomen; nor that cod-liver oil has beneficial effects when applied in like manner; nor that the use of alcoholic epidermical applications *do* stimulate the skin, and not only prevent the renewed want of action termed "taking cold," but promote a feeling of general warmth and a freer action of the pulmonary ciliated epithelia.

And all this is purely empirical, and much of it in apparently direct contradiction of the latest scientific evidence, which seems to prove that alcohol and oil are not absorbed by the skin, and that the corneous layer thereof is impermeable by them.

Yet the fact remains that these substances *and many others do act upon the organism, and by this means of ingress;* and I, as a truthful therapeutist, am obliged to express my conviction thereon, and unhesitatingly recommend what I have so often seen proven efficacious.

This action of alcohol, and its effect upon internal epithelial surfaces, is doubtless reflex (as I do not desire to intimate that temulence can be induced by any amount of bathing of the cutis with spirits), but we *must* have absorption to produce any action whatever other than momentary,—as by corrosive or destructive action productive of shock,—and the immediate effect of the application here recommended is to substitute a feeling of general well-being for one of discomfort, freedom of respiratory movement in lieu of respiratory obstruction, due to a normal desquamation of the epithelia instead of an abnormal dissolution or fusion, the former product being exhaled or otherwise imperceptibly disposed of, whilst the latter product is often driven out only after herculean expiratory efforts, and in some (frequent) instances not at all, but serving in its further retrograde metamorphoses as the nucleus of graver complications.

Upon the external epithelium the treatment produces a precisely similar effect, resulting in the gentle "insensible perspiration" instead of that overflow of watery product known as *sweat*, which in its aberrant production is so distressfully weakening to the system, in that the latter is thereby too rapidly deprived of its soluble salts of potassium, sodium, calcium, iron, etc.

From the foregoing it will be readily perceived that, although by no means a *disciple* of Hahnemann and Hering, I must necessarily practice often upon the principle of *Similia similibus curantur.*

For another instance, illustrative of this mode of procedure, refer again to the early stages of catarrhal disability. To the superficial observer the difficulty is to be met only in the nasal-mucous membrane, or perhaps in the larynx or bronchia; but the more analytic mind will carry investigation much farther, and can hardly fail to perceive that the entire microcosm participates in the disturbance. If the dejections are considered, it will be found that the entire system of epithelial linings is working with energy to perform those respiratory or depurative functions which of right belong to the epithelia of the surfaces more immediately involved.

We do not by any means always have the pathological action so readily give way to physiological activity; hence the necessity for the caution to view the whole field before adopting any given course. The difficulty here under consideration may be complicated by diarrhœa, which, being accompanied with great prostration and articular pain, may seem to the patient the most troublesome symptom.

To proceed at once to the administration of astringents, carminatives, and analgesics would appear to be adopting a counteractive treatment directly opposing the malign forces manifesting themselves; but the result of such a method of procedure would frequently be to suppress a natural depurative effort and precipitate an uræmic explosion, the checking of this action increasing that of another locality, so that the kidneys, the liver, or other important emunctories might be made to suffer for such ill-timed interference.

In symptoms and treatment it is about impossible to distinguish between rheumatism, lithiasis, and gout; the latter seems often to have the preference in the medical mind, but if the practitioner does not desire to be immediately superseded by one who is discreet enough to call it rheumatism, he never speaks of the affection by its family name. However, as it is important in this connection that he should bear it in mind, it would be well to make diligent search for articular neuralgiæ, and learn sufficient of the previous history of the patient's habits to be guided aright as to possibility of lactic or uric acids preponderating in the system. This once ascertained, no wonder need exist that our cold or catarrh should intensify all the other symptoms, and be itself quite intractable under ordinary treatment; it has now, indeed, passed into another category, and may

give place to many localized inflammations, frequently terminating in cardiac disability.

Once having ascertained this condition to exist, I should, as an additional measure in furtherance of successful treatment, invest the patient in a jacket of woolen to be worn next the skin, in order to aid in one generally unrecognized function of the furfuraceous layer thereof, to permit of the *more gradual* dispersion of body-heat by *slow* transpiration, without the liability to sudden chill, to which an extensive moist surface is ever exposed.

Without following out the possibilities of my subject to their various termini, more or less fatal, my mission will have been accomplished if I have induced in your minds a disposition to give earlier and more considerate attention to what is commonly lightly passed over as "only a cold!"

DISCUSSION.

Dr. Meriam: In considering the destructive action of certain medicines upon teeth out of the mouth, it must be remembered that it by no means follows that the same results would follow their application to teeth in the mouth. We know that aromatic sulphuric acid would act strongly if applied to a tooth out of the mouth, but we do not see the same result as we ordinarily use it in our practice. This is, I think, due to the mucous coating upon the teeth.

Those who in old times did metal plate-work will remember that when they wished to clean a plate that had been worn, they had to boil it in soda and remove this coating before acid would act on it. This same coating is found covering the teeth almost like a varnish in some mouths, and acid medicines cannot, in such cases, come into *direct contact with tooth-structure*, which they must do to produce injury. Even teeth that look white and clean will often be found coated, and if touched with iodine will be stained. If one of such teeth be cleaned off with pumice, and iodine be then applied, it will be found that the tooth no longer stains, and the iodine can be easily wiped off. The point I wish to make is the protection given by this coating to the teeth in the ordinary use of acid medicines.

Dr. Andrews: It has been my custom to use litmus paper to test the secretions of the mouth, and in a great many cases I have found them quite acid; in fact, an acid reaction being shown in almost every case.

Where this condition exists, you will find, after having prepared a cavity for filling, that when tested it will show an acid reaction.

In these cases I moisten the cavity with a solution of bicarbonate of soda in water to fully neutralize the acid.

These facts seem to furnish a suggestion we should not ignore.

Dr. Morgan: I think the subject of diseased antrum one of sufficient importance to engage for a short time the attention of this body. Dr. Morrison's report of cases was a very limited one, and confined to one form of those affections, and that in its earlier stages in the main.

He nominated it catarrh of the antrum, and followed it no further than the simplest form of engorgement.

Now, we have diseases of that cavity resulting from other sources than from the usual catarrhal affections. Sometimes it becomes involved in what is generally known as catarrh, and the disease passes along by the nasal cavity and is transmitted by the mucous membrane through the canal into that cavity and we have simply engorgement. Occasionally that engorgement takes a very serious form; the symptoms become formidable; there is pain of the face, neuralgic pain along the upper part of the spinal column, and dizziness, and that to such a degree that I have known the disease mistaken for softening of the brain.

When it assumes so serious a form as that, mere local applications, as counter-irritants, are no better than shooting straws against the wind to arrest it. The cavity must be invaded, and whatever there is of an irritating nature accumulated there must be removed, and the patient put upon constitutional as well as local treatment.

With a scrofulous patient, where the disease has continued for a few months, and there is a lowering of the vital forces, it is necessary to do more than remove the cause of the local trouble; the patient must be placed upon a tonic and stimulant course, and the general system built up. This is particularly necessary where local affections run readily into the destruction of the parts, such as necrosis of the bone.

Some years ago there came into my hands an old gentleman, between seventy-five and eighty years of age, who had been suffering for six or eight years. He had been confined to the house, and had worn a seton in his neck for many months at a time. He was relieved by the opening of the antrum, and by injecting the cavity first with mild escharotics, and afterwards with a mild stimulant. More recently, a patient strongly inclined to scrofula and consumption came

into my hands after many months of suffering. Giddiness and inability to walk about the house were the prominent symptoms, and a physician had diagnosed his case as softening of the brain.

Six weeks of vigorous treatment—opening the antrum immediately below the malar process with a trephine, cleansing the cavity, and stimulation of the parts—resulted in an entire recovery. There was a slight relapse two years afterwards that was very easily managed.

Very frequently, engorgement of that sinus is the result of decayed teeth, and it may originate with any of the teeth. I recently saw a case caused by a canine tooth. The patient was in rather poor health, and spent much of his time in a recumbent position, and the pus which was formed at the root of the tooth gradually percolated back and passed into the antrum, and an engorgement was the result, with violent inflammation and unfavorable general symptoms.

In these cases the first step in the treatment should be a vigorous one, and that is an invasion of the cavity, so that the condition of the parts may be fully understood. If there is necrosis, it should be treated on general principles, and the patient should be put upon a tonic course which will build him up.

Dr. Werner: I think a case of necrosis of the walls of the antrum should not be treated by applications of escharotics or acids. In such cases a surgical operation is necessary, and the less you inject into the cavity the better. I think that this is generally true in all cases where the antrum is involved.

Affections of this cavity generally start with inflammation of its mucous membrane, which is very susceptible to inflammation, and the great principle to be observed, in my experience, is to keep the parts warm and stimulate them. The use of escharotics and acids is painful to the patient; they destroy the mucous membrane, and will leave a sore and painful condition for many days, weeks, or months.

If warm salt water be used, it will be found effectual, and not painful; but if the least acid be used, say carbolic acid, it will be almost intolerable, for such treatment would irritate the parts and produce an eschar which would have to heal by granulation. Such treatment is not at all indicated where the bone is involved. I have lately treated a case of diseased antrum from the right superior first bicuspid, whose pulp had died two years previously.

After two years, abscess of the antrum was developed, starting from abscess of the first bicuspid.

The best results were obtained by mild injections, simply to wash and cleanse the cavity.

A very nice outward application is flannel saturated with hot rum or brandy.

Dr. Atkinson: One that knows anything about the subject before us can hardly go astray if he will ignore fancies and hold his mind closely upon the business in hand. You have been warned by the last speaker against irritation. Do we know what irritation is?

It is the kindly friend that operates the entirety of the nutrition of the body. When you push it beyond the point of *nutrient* irritation it becomes *pathological*, and you had better not urge it beyond that point.

As to the applications to inflamed parts, you will avoid warmth if you know what will be good for your patient. Inflammation is inflammation in whatever territory it is located, and he who resorts to poulticing is on the way to destruction; use either hot or cold applications.

We want to have our attention called directly to this point,—what constitutes irritation? It is a disturbance always where it is in excess of the normal blood-tension.

The blood-tension is governed by the vaso-motor system of nerves, and I need not say another word to you if you have not studied that.

What is abscess of the antrum?

You will never get abscess of the antrum until you have occlusion of the outlets of the antrum. I have known abscess to run ten years, and remain with nothing but a glairy fluid in the cavity, and simply washing with salt and water, as recommended by the last speaker, would be all that would be necessary for a cure if the patient were as healthy as that condition would indicate. As to the case of a cuspid being the source of irritation that induced disease of the antrum, that is explained simply upon a mal-organization, or an abnormal organization of that particular spot of the maxillary bone, its sinus coming forward so that the cuspid penetrated it. Very often this is the case with the bicuspid, and sometimes of the incisor also.

What is the other point of importance for dentists to understand? That they never get local inflammation that is destructive where there is no constitutional deterioration of the protoplasm of the body. There must be that deterioration of the juices of the flesh that indicates want of satisfaction of the molecular metamorphosis, which is called strumous, scrofulous, cachectic, syphilitic, and a thousand other nonsensical expressions that we have studied and memorized without comprehending the signification of. Some of the best pathologists say that scrofulous tendency is inherited syphilitic cachexy.

Sometimes, but very rarely, disease of the mucous membrane may be so aggravated as to seize upon the surfaces of the bones, and thereby induce caries, or even necrosis, but to him who is conversant with these cases there will be very little difficulty in ascertaining when the bones are diseased.

If they are diseased there is but one remedy, and I was very glad to hear the last speaker say that that was a surgical operation. The surgical operation may be performed by the intelligent manipulator, or it may be left to nature to set up the vaunted lines of "demarkation" between the living and the dead bones. Would to God that I had the power to sweep away as with a besom of destruction all the abominable, false, and ridiculous teachings on the subject of caries and necrosis that darken every text-book on surgery that I have ever seen!

We are taught to believe that nature sets up a line of demarkation, and that it is good practice to await this event before attempting to remove the "sequestrum"!

That is the doctrine of the schools and of the books, and I put it right in the teeth of all you surgeons, whoever you may be, everywhere, if that is not a correct presentment of the teachings.

The true doctrine in medicine, as in morals, is to right a wrong action the moment it is known to be wrong. *Make* a line of demarkation for every case by an early extirpation of the necrotic point. This is best done by the engine burr.

Dr. Werner: Did the doctor mean to say that we could not have inflammation without constitutional deterioration?

Dr. Atkinson: I did say that most emphatically, and I give you in proof this instance: No animal in its natural condition ever has inflammation when it is wounded; for its wound always heals by "first intention" if not meddled with. All healthy human organization heals always without inflammation, from any wound that has not a directly destructive poisonous concurrent impression upon the nervous system. The doctor does not discriminate between inflammation and irritation; he does not discriminate between *nutrient* irritation and that which is destructive. You know that they have said that there is adhesive inflammation. That is simply cohesive nonsense.

What I want to say is this, that there is always a letting down from the standard of health in the protoplasm where inflammation occurs from the breaking of any tissue.

Dr. Werner: I claim that in certain stages of inflammation warmth

is the best treatment, and that cold applications are detrimental. Here the inflammation begins where it cannot be seen, and it cannot be known at what moment.

It is necessary to discriminate with regard to the state and location of the inflammation, and hence modify its treatment.

It may be true that we can abort inflammation by application of cold if we could know where it begins; but how are we to know that? It may begin with the least irritation of the vaso-motor system.

How does the doctor discriminate between irritation that is nutritive and that which is pathological?

Dr. Mills: I have had a case of diseased antrum under treatment during the last winter which has given me much practical information, and helped me to understand some things better than I did before. A lady about forty years of age came into my hands. She had been under the care of another practitioner for a distressing case of Riggs's disease, and desired my treatment of this particular difficulty.

I found the case far from having been reached, excepting in spots, and I pursued the course which I am accustomed to do in these cases, and with success as to Riggs's disease; but, contrary to my expectation, I found the patient still in a state of unrest, which she had been all the time associating with the difficulty now cured.

From a remark dropped some time afterward, that on using her handkerchief she found that there was an exudation from the nose, I was instantly led to suspect the trouble to be in the antrum. An examination revealed, at the posterior buccal surface of the third molar, a little inlet to the antrum into which I could run my probe, with care, about two inches, and when I withdrew it there came a very unpleasant odor with it.

Of course I knew there must be trouble there. My treatment of the case was largely in the line of Dr. Atkinson's method. This treatment differs so entirely from that of Dr. Werner that I wish to speak of it because of the success which followed. Having satisfied myself that there was no deterioration of bone, I commenced using injections of lukewarm salt water, but after two days I found there was a good deal of obstruction. I could throw the injections up to a certain point, at which there seemed to be a pressure which caused considerable disturbance. I fell back upon the idea of exciting active inflammation. I injected aromatic sulphuric acid in its full strength, which caused a good deal of pain for the time being, but the results which followed after twenty-four hours were certainly very satisfac-

tory. The activity of the inflammation thus set up was the means of getting rid of the local difficulty.

One or two dressings of that kind, and a mild treatment, consisting of keeping the cavity open and thoroughly cleansed, enabled me after thirteen or fourteen days to bring that antrum into a state of rest and comfort, and with the exception of one slight relapse, the patient has never had any more trouble.

I speak of this as showing the good results which followed this treatment, which I think were obtained in much shorter time than would have been the case by the milder treatment. There are cases undoubtedly presenting a very slight disturbance, in which mild treatment would be all that was necessary.

SECTION IV.

Operative Dentistry.

Report by E. T. DARBY, Chairman *pro tem.*

THE Section on Operative Dentistry is not a little embarrassed in making its report, in consequence of the absence of the chairman, Dr. Keely. The Section has but one paper to present to the Association, but would suggest the discussion of a few subjects which seem to be of sufficient importance to warrant the Section in directing attention to them at the present time.

The first of these is the replantation and transplantation of teeth. A member of the Section reports having met, a few days ago, at one of our local societies, a gentleman who assured him that a friend of his had shown him sixteen cases of transplantation, and in his judgment they promise success. The replantation of teeth is more common in this country than the transplantation of them, but it is probable that many of the members present have had one or more cases of transplantation, and the history of such cases cannot fail to be of interest to the Association.

Another subject that the Section deemed worthy of consideration is plastic materials and the improvements that have been made in them during the past year. It is not intended to introduce the theories of the so-called New Departure men, but simply to bring forward the improvements in materials for discussion. The improvements in the preparation of gold for filling teeth—such, for instance, as platinized gold, which is being used extensively by some—are also suggested for your consideration.

There is no more fit time or place to discuss the improvements in operative dentistry than now and here.

The Association will be pleased to learn of the presence in this assembly of Dr. Joshua Tucker, of this city, one of the oldest, if not the oldest, practitioners in the United States. At the earnest solicitation of some members of the Section he has consented to address the Association. He will perhaps speak to you upon some subject

closely allied to operative dentistry, possibly relating to the use of the old soft foil.

Dr. Tucker's name and reputation are familiar to the dental profession, and it will be a pleasure to this entire body to see his face and hear his voice at this time.

SECTION IV.—Continued.

VOLUNTEER ESSAY BY JOHN J. R. PATRICK, OF BELLEVILLE, ILL.

Oral Electricity and the New Departure.

IN questions of physics, or the laws governing material substances, mere opinion is often confounded with demonstration. I believe that most men are honest in their statements concerning their experience, their experiments, and their observations; but these must be capable of verification and demonstration, otherwise we should be in the condition of the man who resolved to regulate his watch by the town-clock, but would not inquire whether the town-clock was right or not. Outside of the known laws which govern the properties of matter, all becomes conjecture; and as there is no limit to the possible conjectures one may make regarding things beyond the power of demonstration, there can be no end to the disagreements that will arise if we permit ourselves to embark upon this troubled sea of dignified guess-work.

The materials used for filling teeth cannot be intelligently discussed independently of the tooth-substance and its surroundings. Every element that enters into the composition of the living body, and every substance that is likely to come in contact with the material used for filling the teeth, the chemical affinity of the several substances present in the mouth, and the energy or force set free by molecular change, must all be considered before a scientific deduction can be established.

Opinions and theories of men, based on their own experience and observation, especially when such experience relates to scientific matters or manipulative skill, include so many undecided questions, that it is not only unscientific, but dangerous, and even frivolous, to hastily adopt them. The frequent failures in filling teeth with gold by the

most conscientious operators—men who spare no pains to perform their work to the utmost of their ability—are too apt to lead them to seek the cause of failure outside of themselves; for no man who honestly does his utmost is willing to suspect a lack of manipulative skill as the cause of his failure. No man feels composed under the imputation of a want of skill in his profession. If he is an imaginative man, he at once seeks redress and an explanation of his failures in a wild wilderness of speculation, in which there is no definite coherence. Hypothetic currents of electricity are mixed up with incompatibility of tooth-substance, chemical interaction, and filling material. Imagination unconsciously takes the place of reason, the inventive faculty is exercised in the interests of previous expectation, and emotional experiments are prosecuted with all the outward appearance of scientific accuracy—for scientific instruments are used (or rather abused) with automatic activity, regardless of the laws of exact association, and in the interests of the dominant idea. There are so many obscure phenomena connected with electricity, so much of its action is undecided, and not reduced to law, that it offers superior inducements to persons of a marvelous tendency to revel in its mysteries, and to float in confident security, like the atoms of Epicurus, in a void.

There are other causes that have been equally as fruitful as defective manipulation in creating a belief in the superiority of plastic filling.

1st. The continued appeals on the part of patients for inexpensive work. For instance, it is frequently the case that a well-dressed man, wearing diamond jewelry, will request his dentist to use the cheapest possible material; and a majority of women will spend more money in one year with their milliners than they will with their dentists in ten years, and still feel the tax of the dentist the heavier of the two.

2d. The ease of the patient and operator in the use of plastic materials.

3d. The more profitable employment in a monetary point of view to the operator.

4th. The deep interest shown by the champions and promulgators of this old system revived in putting compounds of their own manufacture upon the market.

Prof. J. Foster Flagg has given to the world his pamphlet on the "Basal Principles of the New Departure," and declares that he is but the mouth-piece of Prof. Henry S. Chase and Dr. S. B. Palmer,

and fully indorses the creed of these two gentlemen, that "The electro-chemical theory of the action of filling material and tooth-substance, and the incompatibility of gold with 'Dentos,' make gold the worst material to use for saving teeth."

Prof. Flagg further states in his pamphlet that with the assistance of Prof. Morton, of Hoboken; Prof. Snyder, of Philadelphia; Messrs. Eckfeldt and Du Bois, assayers of the Philadelphia Mint, together with Drs. Palmer and Chase, dentists, he has "carefully and scientifically investigated, with the best instruments and apparatus the country has produced, every line of experiment which professed to show a current, which they believed to be eliminated by contact of metal with tooth bone, and found that such current had never been shown, much less measured." So that Prof. Flagg falls back upon belief and his own acknowledged failures to preserve teeth with gold for the hypothesis of electric currents destroying tooth-bone when gold is employed in filling teeth.

Prof. Flagg betrays the influence of some of the inducements I have enumerated for using plastic fillings in preference to gold, when he says that "teeth are safer in the hands of the majority of practitioners turned out from our schools with a plastic material for filling than with gold." This is a humiliating confession, and so much the worse for our professors and our schools; for the dentist who cannot manipulate gold, either for plate or for filling, must take a back seat; he has no business in the profession. Notwithstanding the failure to demonstrate the electric current, Dr. Flagg constantly refers his readers to the two dental electricians, Drs. Palmer and Chase, and informs us that letters by the score passed between Syracuse, St. Louis, and Philadelphia on the subject, and that finally these three gentlemen were ready to promulgate the doctrines of the New Departure, or, more properly speaking, they were ready to present to the profession some new honey that they had abstracted from old hives. In reviewing the published experiments of Dr. Chase, which are indorsed by his co-laborers, I find them so full of fallacies, contradictions, and misconstructions of physical law, that a few instances will suffice to render his whole line of experiments worthless. On pages 201 and 202 of the *Missouri Dental Journal*, for the year 1876, the following sentences occur:

"1st. The oral cavity may be compared in some sense to a single cell of a voltaic battery.

"2d. Where the teeth are all sound and the oral fluids are in a perfectly physiological condition, the mouth is not a voltaic battery.

"3d. There is probably more or less electricity evolved in the ordinary mouth nearly all the time, more especially if there is a tooth plugged with any metal whatever."

Here are three equivocal statements, if not contradictions. The first compares the mouth to a voltaic battery, the second denies it, and the third sustains the first proposition.

On pages 202 and 203 the doctor states a well-established law in electro-metallurgy,—that "The electric current passes from the positive element to the negative one, and that element is positive which is most easily acted upon by the fluid in which the elements are immersed; and that element is negative which is less acted upon." In other words, the positive pole is that metal which is dissolved, and the negative pole is that metal or substance upon which the metal is being deposited by the influence of the electric current, electricity simply being the carrier of the metal from the positive to the negative pole, as in the electrotype process. On the same page (203) the doctor says that "*dentos* is a bad conductor of electricity, and therefore it is a negative element in the *oral battery*."

I reply that a tooth is a good conductor of electricity, since it is permeated by the fluids of the tubuli. For proof of this assertion, grasp one of the poles of a battery and bring the other pole in contact with the teeth, which will readily determine this question. If "dentos" were a negative element in the "oral battery" and the filling material positive, by all the laws of electro-metallurgy the filling material would go to the "dentos" (the place where it usually is needed), not the "dentos" to the filling material. In other words, the metal filling being positive must waste away and be carried by the current to the "dentos" and be deposited upon it either in the form of salts or of metal, and the dentine will remain intact.

The whole of page 204 is devoted to contradicting his former statements, and to promulgating a few electrical impossibilities. One instance will suffice: "The electrical action between two substances is none the less on account of the resistance offered to the passage of the current."

Now, it is a well-established fact among electro-metallurgists that the negative pole is only considered as acting the part of a conductor, and resistance to the passage of a current stops the action.

On page 205 he says, "A piece of muscle impacted between two teeth will produce considerable of a current, which is usually so annoying that removal of the substance seems an immediate necessity to the individual."

Of course, when an electrician has the cause to investigate, this annoyance could not be produced by the simple effect of mechanical pressure.

On page 208 the doctor recommends the use of tin and gold, and describes the method of using them: "But the better method to use tin and gold in the same cavity is to employ cylinders of tin only, and of gold only, always keeping the tin next to the walls of the cavity and using only gold in the centre of the plug." I will simply state that the interposing of tin between gold and the substance of the tooth as a protector of the dentine from the action of the gold (if such action existed) would not affect the polarity in the least; the tin would act merely as a conductor. But if I wished to form a little cell or electric combination in the mouth by the simple contact of two metals, I could hardly devise a better method, for gold being one of the most negative of metals, a feeble action might take place between the two.

Currents produced by contact alone are always extremely weak. A much stronger current would take place between an amalgam of zinc and one of silver, placed in the same position, for, although silver is not as negative a metal as gold, it possesses the highest conductive power of all metals. The tooth-substance would not be a factor in the case, for we all know that tooth-substance is composed of salts, which always impede electric currents, the gelatine and water being the only material in the tooth that could act as a conductor. A desiccated tooth would be a complete insulator.

Gold is not attacked by any single acid (except selenic), does not tarnish in dry or moist atmosphere at any temperature, and is not affected by sulphur, iodine, or phosphorus. Tin, on the contrary, tarnishes or oxidizes slowly in moist atmosphere. *Its oxides combine with vegetable acids*, and its salts in solution will attack and combine chemically with the substance of the teeth. Its power to chemically unite with tooth-substance is only equaled by mercury and silver. When new compounds are formed by the chemical affinity of elementary bodies, and change of molecules takes place, or when compounds are recompounded by the same agency, organisms may be destroyed or built up. In either case passive or active electricity may be evolved. This law of chemical affinity is beautifully illustrated in the incubation of an egg. It is well known that the body of an egg contains neither phosphoric acid nor lime, but both these substances exist in the shell, which becomes thinner and thinner during the whole time of incubation, till the living embryon appropriates a sufficient quan-

tity for the formation of its bones; part of the albumen combines with the shell for this purpose, and another portion forms the feathers.

It is also remarkable that though phosphate of lime is always present in the urine of adults, it is not found in the urine of infants; the rapid formation of bones in the first periods of life appropriates all of this salt eliminated. So we can rest content, if the phosphate of lime is present in the urine, that the supply is greater than the demand for it in forming tooth-substance.

What Dr. Chase and his co-laborers wish to prove is, that gold, from its power to resist chemical action, is to be considered the worst material for filling teeth, because it is one of the most negative of metals,—that is, that the dentos is dissolved and goes over to the negative pole; but by his own confession his instruments do not indicate that dentos is a positive element in his oral battery. Dr. W. C. Barrett, of Buffalo, New York, in his very able review of the so-called "New Departure," very successfully quotes Dr. Palmer against himself. In a paper read before the State Dental Society of New York, in 1874, Dr. Palmer says, "A porous tooth containing an amalgam plug has in it the elements of a minute but intense *battery* capable of decomposing not only the plug but the tooth around it." This early statement of Dr. Palmer's proposes an impossibility, for gold, silver, platinum, and tin, fused together and then reduced to filings and afterwards amalgamated with 60 per cent. of mercury, *would not* and *could not* polarize to form an electric combination, much less a "battery." The molecules of each separate metal would be positive and negative to each other in such a confusion of infinite quantities that they would neutralize each other's action. I know of no means of forming an electric combination in the mouth except by filling a superior tooth with a zinc amalgam and an inferior antagonizing one with a silver amalgam, so that they would come in contact. Then I admit that a circuit would be formed through the moist tissues of the mouth from the zinc to the silver, and, in case of an acid condition of the fluids of the mouth, electric excitement would take place every time the two metals came in contact;—if the fluids were neutral, electric excitement would take place feebly.

That electric currents should be generated in the mouth, and that when present they should be destructive of bony tissue, so far from being true from a scientific point of view, is not, I think, even theoretically possible, for the following reasons:

1st. The electric taste is an excessively delicate test of an electric

current; signals may be tasted which even the most delicate galvanometer will fail to detect.

2d. Very strong currents of electricity have been used daily for months and years as a therapeutic agent in cases of paralysis, and it is in constant use as a stimulant to tetanize dormant muscle, without being in the least destructive of bony tissue.

It is not electricity that does the mischief; it is defective filling with gold and a change of molecules in other materials used for filling teeth, and this takes place when no current could be perceptible. Diffuse electricity may take place on the decomposition of any substance, but it must be remembered that electricity is the result, and not the cause, of molecular change.

In the June (1877) number of the *Missouri Dental Journal*, on page 223, Dr. Chase sums up the results of his experiments and observations, and embodies them in the following sentences: "Gold is not oxidizable in the mouth, and in itself may be said to be permanent, but the tooth suffers more from that fact. *It is the tooth-substance* that does not last; the metals of which plugs are made *last* long enough. Their slow surface chemical disintegration is *desirable* in an acid condition of the mouth. A plug that will not do this is a greater enemy to dentos than one that will." These sentences need no comment.

In the *Journal* of July 15 of the same year the doctor gives freely the results of his experiments in dental alloys, and publishes three formulas. The first formula contains equal parts of gold, silver, and tin, amalgamated with 80 per cent. of mercury, or, if 20 parts of tin filings are added, 60 per cent., which makes $146\frac{2}{3}$ parts of tin, silver, and mercury, and $33\frac{1}{3}$ parts of gold. This amalgam, while it contains so small a proportion of gold, is far richer in that metal than any alloy in the market, for where platinum is used it only takes the place of gold or divides the honors with that metal.

Now, why use gold at all? If gold is incompatible with tooth-substance, so is platinum. Why use these expensive metals in such connection? Are there no fears that this seductive and dangerous gold will corrupt the virtues of the other four metals? Is it not a short-sighted liberality to use it in such connection when it is useless? But if it be dangerous to the integrity of tooth-substance, is it not culpable?

When Thomas Fletcher produced the platinum and gold alloy, it was an improvement on Dr. Townsend's amalgam of tin and silver, as much so as Dr. Townsend's amalgam was an improvement on the

zinc and tin amalgams in use forty years ago; and I can assure you it was no spasmodic fit of emotional generosity that induced Fletcher to add the gold and platinum to the silver and tin of Townsend and smelt them together, producing a more intimate connection of their particles than could have been obtained in the filings of the separate metals. The wide difference of expansion and contraction of the several metals under thermal influence is to a trifling extent compensated thereby. This was his object, and this is why test-tubes were introduced. The elements that are constantly present in the body, that unite directly with silver, tin, and mercury, were no consideration with Thomas Fletcher, and, as far as this controversy has gone, I am not aware that they have been introduced by any one. I, therefore, with the tenderest regard for electricity, beg leave to present for your consideration, sulphur, iodine, and phosphorus, a trinity of elements which have a great attachment for silver, mercury, and tin. But more especially do I recommend them to the attention of the advocates of this new doctrine.

Sulphur.

There is no other element so widely distributed in the animal, vegetable, and mineral kingdoms as sulphur. Nature employs it in most of her operations. She presents it under many forms among fossils; charges with it the waters known as sulphurous; mineralizes with it most of the metals forming iron pyrites, galena, cinnabar, blende, and silver glance; causes it to pass into the vegetable and animal fibres, and forms an infinite number of combinations with the earths. Sulphur is present in horse-radish, cresses, and many other vegetables, and is a constituent of the volatile oils of mustard, garlic, and assafœtida, and of albumen and other proteids. It is always evolved, in combination with hydrogen, from animal substances during their putrefaction; and the change which silver undergoes when immersed in mustard or an egg shows the presence of sulphur, and the strong affinity it has for that metal. When taken into the system with food, or exhibited as a medicine, it penetrates to the extremities of the most minute vessels, and impregnates all the secretions. It shows a tendency to unite with mercury equally as strong as its affinity for metallic silver, for there are instances on record of persons having been subjected to mercurial medicine for a short time, and upon the outward application of sulphur ointment for a few hours, the spot where the ointment was applied became quite black. This was occasioned by the mercury exuding through the pores of the

skin to unite with the sulphur, in consequence of its affinity for that substance, and a true ethiops-mineral was formed. A beautiful illustration of this principle is shown in one process of parting gold and silver: The silver being in excess, the two metals are melted and rolled into thin plates; then a layer of sulphur and a plate are alternately disposed, whereupon the sulphur unites with the silver, forming a sulphuret of silver in the form of a black powder, which is washed out, leaving the gold in a spongy condition, but pure. Sulphur does not unite with metallic gold or platinum, but it will form an auric sulphide when united with the cyanide of gold.

The constant presence of sulphur in the system, and the intense chemical energy of sulphur for silver and mercury, render these metals unfit for the purposes of saving teeth. The small amount of gold and platinum present in Fletcher's or any other alloy, gives no protection to silver or mercury from the invasion of sulphur. Sulphuret of silver and of mercury is formed in the cavity of the tooth in which an amalgam filling is placed, for the reason that the fluids in the tooth-substance convey the sulphur to the silver. Any amalgam filling removed will be found to be black where it comes in contact with tooth-substance, I care not how the amalgam may have stood the test for leakage in glass tubes before using. When we reflect on the complicated structure of a tooth, and consider the facts that a constant circulation is sustained as long as vitality remains, and that even in a dead tooth the same canals permit the fluids of the body to pass through its substance, the pleasing thought of a moisture-tight filling, that will not allow any moisture between itself and the bony walls which surround it, becomes a mere phantom. Oxygen has been accused of darkening amalgam and tin fillings on the outside. It does its share where the fillings are exposed to the atmosphere, but sulphur attacks them all over. Sulphur will sever its connection with rubber after it has been vulcanized to unite with silver, if silver is placed in contact.

Iodine.

Iodine, next to sulphur, is one of the most widely diffused of elementary bodies. It vaporizes at the ordinary temperatures; it is found in some minerals combined with mercury and silver; unites readily with the different salts, but enters into combination directly with metallic mercury, silver, tin, copper, and zinc, forming the iodides of these metals. Aside from its natural presence in the system, it is used largely as a therapeutic agent (stimulant, absorbent, emmena-

gogue, and alterative). From its known affinity for mercury, it is used in collutories for relieving mercurial sore mouth; and in cases of chronic mercurial poisoning the administration of iodine furnishes the most effective means of eliminating mercury from the system, thereby curing paralysis, neuralgia, and other symptoms of poisoning from this metal, for all soluble salts of mercury are poisonous.

Phosphorus.

This non-metallic element is widely diffused; it enters largely into combination with the oxide of calcium (lime) and magnesium in the formation of bone; and in the dentine of the human teeth the phosphate of lime and magnesia constitute 63 per cent., and in the enamel 86 per cent. Phosphorus unites readily with metallic salts, and unites slowly with metallic silver, mercury, tin, copper, and zinc, but it will not unite with metallic gold or platinum.

Chloride of Sodium.

This compound of muriatic acid and sodium, when reduced to dryness, forming the chloride of sodium, is found native in extensive beds, and enters largely into all organized bodies, and is essential to the digestion of food. A great deal has been said and written in regard to the combination of this salt with the mercury contained in an amalgam filling, forming the chloride of mercury (calomel), and the corrosive chloride of mercury (corrosive sub.). I confess that I do not see how such a compound can be produced in the human mouth, for the sulphate of mercury must first be formed with sulphuric acid, then boiled to a dry powder, the salt added afterwards and the two rubbed together, and then sublimed with a gradual heat, when the vapors of perchloride of mercury arising are condensed in the cool part of the apparatus, which vapors are the chloride of mercury. A very simple or mild chloride of mercury can be formed by rubbing metallic mercury with salt, but such a combination would be mechanical, and, I think, harmless. If, however, the sulphuret of mercury had formed around large amalgam fillings, and had combined with the salt in the system, or with that taken into the mouth, there would certainly be produced a chloride of mercury of a very mild character; as all soluble salts of mercury are poisonous, and it being a well-established fact that some persons are more susceptible to the influence of mercury than others, if there were no other reasons for discarding the use of this metal in the mouth, then the

fear of this combination alone should be sufficient to throw it out from the list of filling materials.

In the selection of filling materials, to secure a good result it is indispensable that the filling should fit the walls of the cavity perfectly, and that it should exclude completely all those external agencies which induce decay; that it should be solid and undivided in all its parts, fitting it to resist all pressure likely to be brought to bear against it; and, finally, that it should resist to the fullest extent chemical action, thermal influence, and attrition.

So long as we are confined to the use of metals for filling material, there is no metal or combination of metals or substances that has yet been found that can take the place of gold for that purpose. It possesses more of the valuable properties of the force of cohesion (hardness, elasticity, malleability, ductility, etc.) than any other metal; it is capable of receiving and retaining additional powers of cohesion by the application of coercive force; and when combined with small quantities of its sister-metal, platinum, its hardness and elasticity are greatly enhanced by the joint action of adhesion and cohesion; in fact, the attraction of cohesion in gold is so powerful, that at ordinary temperatures it will unite under coercive force almost equally as well as iron or platinum under the influence of heat. Like platinum, it is not influenced by any single acid or alkali; it does not tarnish in moist or dry atmosphere at any temperature, and it is not affected by sulphur, iodine, or phosphorus.

Cohesion of Amalgams.

All metals lose their natural coherence when alloyed, and when amalgamated with mercury the standard of cohesion is further reduced. Silver and mercury do not oxidize in the atmosphere at ordinary temperatures, but when the silver is amalgamated with mercury the silver oxidizes, owing to its having lost much of its cohesive force. Platinum and mercury do not unite,—the hardest metal to fuse and the metal which is in a fused state at ordinary temperature have no sympathy for each other. Copper will not unite with mercury, but will unite with the nitrate of mercury, and the combination will then receive additional quantities of the metal mercury.

On contact, gold and tin, either separately or combined, unite with mercury perfectly, and give up their cohesive properties in their combination with the mercury; for this reason the amalgam

does not harden, and the gold and tin lose all their individuality in the combination.

Silver and zinc, either separately or combined, unite readily with mercury; they lose much of their cohesive force, expand in hardening, destroying the fluidity of the mercury, and losing all their own peculiar properties.

Expansion and Contraction of Metals.

The superficial expansion of a metal is equal to twice its linear expansion, and the cubical expansion to three times the linear. The metals used by the dental profession are the following, the most expansible standing first in order: mercury, zinc, tin, silver, copper, gold, platinum.

Mercury is so expansible that it is classed among the liquids, and vapor arises from it even at the freezing-point of water in sufficient quantity to whiten gold-leaf; the temperature of the human body (98° F.) is sufficient to overcome the whole of its cohesive force. Thus mercury, tin, and silver, forming nearly the whole body of amalgam fillings, must be measured by their cubical expansion under the influence of heat, and a corresponding contraction under the influence of cold.

Conduction.

The thermal conductivity of the metals in use stands in the following order as regards their thermal conductivity: silver, copper, gold, tin, and platinum. Mercury is so poor a conductor that heat vaporizes it at ordinary temperature.

New and original research requires a singular independence of mind, and, unfortunately for the cause of progress, such minds are at all times rare. The electro-chemical theory for the destruction of tooth-substance in contact with gold only lacks the facts to sustain it, but when men need facts to sustain a favorite or plausible theory, they are not long in seeing the facts required; everything becomes clear in the uncertainty; a little experiment, a little straining of the eyes, and all is seen that they believe they ought to see. And thus they sail on an unknown ocean, trusting to hypothetical charts, to compasses of their own invention, in which the essential feature is the omission of that magnet which can alone give security.

Yet for ages this has been the only seamanship deemed necessary or practical in the history of medicine and its many specialties. And how many still trust to it implicitly! Thanks to the inroads that

physical science has made on our domain, the dawn of a better day is fast approaching, and the next generation must witness disclosures not less startling than those which have electrified the present day. In the mean time what we want is a careful classification of existing facts (physics, not metaphysics), their exact relation to each other, the great aim being to discover a genuine sequence of phenomena traced link by link to a definite cause.

The opinions advanced by Professors Flagg and Chase, and Dr. Palmer, are acquiesced in, either actively or passively, by many of those with whom they are working, as well as by others who are but slightly acquainted with the subject themselves, but who very naturally look up to the professors in their scientific character as authorities in all such matters. Were these simply theoretic opinions, they might very safely be left to the ordinary action of that silent criticism which quietly hands over to oblivion so many errors. But when we find them taken up by active, energetic men, and used as an important portion of their working machinery to increase the sale of mercurial compounds for filling material, they must be met in a formal and emphatic manner; and this becomes all the more necessary when we find them countenanced by writers in the same profession who have little, if any, monetary feeling in the matter, but who have simply been misled by superficial considerations.

Résumé.

In recapitulating some of the observations recorded in this essay, I desire to call attention to the following propositions: A voltaic battery cannot exist excepting in the manner directed by Professor Volta, the inventor or discoverer. It consists of an equal number of pieces of zinc, silver, and pasteboard; the pasteboard pieces are soaked in a solution of chloride of sodium, and then are piled with the metals in the following manner: zinc, silver, pasteboard, and so on, in the same order, the uppermost plate being of silver, and the undermost plate of zinc. These exterior plates, to each of which a wire is attached, form the terminals or poles of the pile. This was the first form of those instruments now so well known by the general name, "galvanic battery." The word battery is not applicable to any arrangement of elements present in the mouth. An electric battery is a collection of distinct cells, each cell so arranged in its elements as to secure an electric combination, and each combined cell so electrically joined to the others as to secure an unity of the whole, thus forming a battery.

The methods of construction of batteries for the generation of electricity are various and peculiar, both in regard to the material used and the arrangement. Thus we have a Smee's, a Grove's, and a Daniell's battery, each bearing the name of its inventor; and when "Dentos and Gold" shall be proved to form an electrical combination, and be proved to be a battery, *it* may also bear the name or names of the inventors.

If vapor rises from mercury at the freezing point of water in sufficient quantity to whiten gold-leaf, an amalgam filling subjected to the heat of the human body (98° F.) must gradually part with its mercury by vaporization. This can be demonstrated by selecting a few old amalgam fillings, and, after accurately weighing them, submitting them to a heat sufficient to evaporate mercury. This being done, let the mass cool and again weigh, when it will be found to weigh as much as it did before heating. As a further test of the divisibility of mercury under the influence of heat, take one hundred parts of Fletcher's alloy, add sixty parts by weight of mercury, and allow it to harden; then submit it to a sufficient heat to vaporize the mercury, and weigh the residue, and there will be found one hundred parts,—the mercury having disappeared.

Therefore, when an individual, either by bad counsel or a false economy, has been subjected to mercurial or amalgam treatment for diseased teeth, we find that fifty parts of the mercury out of the sixty used in forming the amalgam are vaporized by the heat of the body in a few years, and taken into the system in small but regular quantities,—the most potent manner of administering mercury for a constitutional effect. Should not this be sufficient to induce every conscientious practitioner to discard all amalgams from the list of filling materials, and be the means of inducing others to be less presumptuous in their speculations, and more honorable and resolute in their practice?

DISCUSSION.

Dr. Tucker: Very unexpectedly do I stand before you to-day, although I am very happy to meet you. I came here not with any expectation of saying a word, but some of my old friends insist upon my saying something with reference to the old system of filling teeth.

I have only to say that I am stronger now than ever before in the opinion that the old system of filling the teeth with soft gold and

hand-pressure against the walls of the cavity was the true scientific method. I have watched with great interest the changes that have come over our profession. I have had many discussions upon the subject, and at the first introduction of cohesive gold and the mallet I condemned the practice, as all the dentists of Boston know, claiming that the principle was wrong.

I admit that a more beautiful filling can be made and a better surface secured with cohesive than with soft foil, and that a tooth may be built out as desired, but that is not all that is wanted of a filling material: what is wanted is that which will best preserve the teeth. There is a circulation going on through the dentine continually, and the mistake has been made by many in supposing that by pounding cohesive gold hard against the walls they would stop the circulation through the tubuli.

In my judgment, the moment you strike the gold with your hammer you condense it and it becomes solid. You cannot spread or wedge it after you have struck it with your hammer. The principle of preserving teeth, in my judgment, lies in stopping the ends of the tubuli, and if you dam or seal up the ends of the tubes ossification will commence there at once.

In proof of this, if you fill a sensitive tooth with oxychloride of zinc or with gold, you will find, upon removing the filling after some time, that the sensitiveness has disappeared. This, in my opinion, is effected by the sealing up of the ends of the tubes, thus stopping exudation from within and preventing decay back of the gold. For decay is produced more from morbid action of the fluids back of the gold than around the orifice. As I watched teeth in my early years of practice, I did not find them decaying around the orifice, but back of the gold, the circulation from the tubes not being stopped. This fluid by chemical reaction forms a solvent which acts on the dentine, so that you will find your tooth is turning blue back of the gold.

I will say that in our old method of filling teeth our object was never to make the gold solid against the wall or on the floor of the cavity,—never,—but to press it laterally against the wall, so that the particles of soft gold would stop the tubuli, and when so pressed against the walls never to move it, for if you do it will make a failure. If the gold is packed with equal density in the cavity, then, by condensing the gold on the surface, you have made, as it were, an artificial enamel, because you have made the surface so solid that the fluids of the mouth cannot affect it. If I have made this clear to you, I am satisfied, but I repeat that in my judgment the mistake

in filling teeth at the present day is from not stopping the tubuli in a proper manner.

As you all know, I suppose, I introduced my gold in pellets, pressed them one against the other, as you would press leaves in a book, until the cavity was full; then condensed the surface, and spent a great deal of time in finishing it, making it solid and firm against the edge of the orifice, and by this method fillings were introduced forty-three or forty-four years ago that are good now.

I am sorry to say that it is said that many fillings put in lately with the mallet do not prove altogether satisfactory. The remark is made to me very often.

If there is anything in the practice of the old method that is truly scientific, it appears to me that the nearer you draw to it the better it will be for our profession.

Dr. Atkinson: I was astonished when the paper just read was said to have been submitted to the Section and adjudged worthy of record with the secretary. Any English scholar who read the wretched platitudes and miserable verbiage of the paper, and defended it by adjudging it worthy to consume the time of this body, needs to go to school. What do you think of the "wild-wilderness" and the whole host of such abominable trash as that from a man who claims to know anything about natural philosophy, giving us such wretched, driveling misconceptions and misstatements!

This paper speaks of the possibility of a single body (aside from oxygen) being capable of producing action upon the organism; and says that vaporized mercury, as mercury, would be absorbed to the extent of fifty per cent. of an amalgam filling into the system. In the first place, you must combine the molecules of the mercury with some other agent before they have any affinity for the body at all.

One who is familiar with the old method of making looking-glasses with tin foil and mercury knows that the workman would be literally saturated with it, so that he would not be capable of handling a gold or silver watch without its becoming amalgamated, and all this, too, without his health being compromised by the mercury, so long as it remained in the metallic state.

I am in earnest about this, and think so many intelligent faces and consciences as are before me ought not to spend the time of this body with such unprofitable trash as I consider the paper to be. If this paper is valuable anywhere it is valuable in the hands of experts, who are thoroughly up to the latest apprehension of what science is, and then, if they would correct it and give us the real value that is

in it, it would occupy about one or two minutes. That is all I have to say.

Dr. Buckingham: I want to take exception to that mode of discussion which merely asserts that things are trash, without giving us any evidence that they are trash. I contend that there are scientific points in the paper just read that ought to be discussed fairly and plainly,—subjects really of as much importance to us as any others that come before us. Any man can use harsh language and denounce things in the manner in which we have just heard them denounced, but it is not right that important subjects should be treated in that way. The author has taken up the subject properly and discussed it properly.

The subjects are so deep that we are not able to get to the bottom, but the paper is much better than many that are read here. I am not able to discuss it at the present time.

The theory of most of those advocating the so-called "New Departure" is, that there is no chemical change unless there is an electric current produced. Even the decomposition of wood, or any other chemical action, is nothing but an electrical change! If you carry electricity so far as that, you have electricity in everything; no change can take place without some electrical effect.

The more you begin to study a battery, even the very simplest kind, the more difficulty you find. I venture to say there is not one man in a thousand that can explain even the simplest of them. They are exceedingly complicated, and though we observe certain results taking place we cannot trace them step by step to their source.

You recollect some years ago, when some few of the dentists in different parts of the country undertook to say that all kinds of acids were formed in the mouth. The elements are there, they said, and why not the acids? But because you have the elements it does not follow that you have the acids, because the elements do not always combine to produce them. It is a question for us to determine whether the decomposition of tooth-structure is what it is supposed to be.

I venture to say there is not one here that can tell you what decay of a tooth is. You will find as many theories about the decay of a tooth as you will find persons who undertake to describe it. The facts discussed in this paper lie at the very foundation of our principles, and they should be discussed carefully; and no essayist should be denounced in the language that has been used here until the utter fallacy of his positions has been established.

Dr. Atkinson: It requires intelligence on the part of the listener to comprehend what is said, and individuals, unable to follow the thread of mental action of the speaker, should have the modesty not to put their lame interpretations upon it and cite it as an offense committed by the speaker.

I did say, and I leave it to every one if I did not make the point of my speech against the possibility of mercury alone having any effect upon the human body, and that it must be combined with something else before any effect was produced. Now, as to finding fault with the study of the depths of the science, I am the last man to do that.

The point is this: that we need to discriminate between the things that we fancy and the things that we know.

I do say that I had a perfect right to characterize that paper from my stand-point, and assert my objections and how it impressed me, and I hold I did it justly and honestly, and for the love I bear to this body and to the truth, and persons not capable of feeling that love should have the modesty not to say unkind things.

The last speaker says there is not a man here that can define decay. I will define decay for him: *de*, down, and *cado*, I fall, I fall down,—falling apart. There are two ways of falling apart, especially of the constituents of the human body. One is by a regular retrograde metamorphosis of going down the constructive ladder. Old John Hunter said by an inspiration, two hundred years ago, that "Inflammation is nothing other than the return of the tissues to the embryonic condition." Now I have told you what decay is. When inflammation seizes the tooth-structure, it acts by that progress of retrogressive molecular metamorphosis, and dissolves by simply taking out the lime-salts, in the first place, and then tumbling to pieces chemically, by expelling one constituent after another until destruction is complete.

That is decay ordinarily. There is another degree of decay that is also chemical, effected by applying an acid or alkali that holds a greater affinity for some one of the elements of tooth-substance than these hold for each other. This is chemical solution (decay) *par excellence!*

Dr. Allport: Dr. Atkinson has spoken about the action of mercury and its combination with other substances. I would like to ask him what that combination is, what change it is that takes place, and the effects produced upon the system by the use of mercury as referred to here?

Dr. Atkinson: My observation is that there are only two combinations of mercury in common use that are said to be deleterious to the human body; and one only is truly poisonous, which is the bi-chloride, or corrosive sublimate. When this is used in considerable quantity, it acts very destructively upon the tissues.

Dr. Buckingham: Dr. Atkinson's explanation of decay is the most comprehensive I have heard. Every chemical change which takes place, according to his theory, is decay. Unfortunately for our language, we must have words to convey ideas, and words are not facts. Nobody will undertake to say that fire burning up wood is decay, and yet when you have the wood decomposed by oxidation and by decay the process is the same. The doctor has noticed the process by which the tissues of the tooth are broken down, and the chemical changes that take place, one element going to one side, and the other to the other. There are two forces in operation during the process of decay.

There is a vital power that protects the tissue. You destroy that vital power, and when decay sets in it is a chemical decomposition.

The action of mercury on the system cannot be explained, nor, in fact, that of any other remedy. There is no other science that is so empirical in its practice as the science of medicine.

You take the simplest element,—the mercury which may be taken into the system, and chlorine, which we take every day in common salt, and these two elements, when separate, have little action on the body, and yet when you combine them they make a most poisonous agent. How do you explain this? How do you explain any of these actions upon the system, that of morphine, of strychnine, and other poisons when taken into the system? How do they act? They produce a recognized effect, but we cannot tell how they act. If you break up the combinations, what are they? Put them in a certain form, and they become the most deadly poison. It is all empirical. We do not know anything about it, and there is no book published that gives you the action of medicine upon the system.

Dr. Allport: I was very much pleased with the remarks of our old friend and father, Dr. Tucker, with regard to the use of soft—non-cohesive—gold in the filling of teeth. Most of you are aware of the ideas which I have entertained for many years upon that subject, and how much from the very first I have been opposed to the exclusive use of cohesive gold in fillings.

Of course, cohesive gold has its proper place. It is useful for covering or finishing fillings made of non-cohesive gold, and for contour

operations,—the building-up of crowns and restoring them to their original shape. The filling of a cavity and the restoration of a tooth to its original shape are entirely different operations, and require a different quality of material as well as manner of manipulation. The object in filling a tooth is to arrest decay, and this is done by such a perfect adaptation of a filling to the walls of the cavity of decay as to exclude moisture, from whatever source. The agents employed for this purpose should be such as will enable the operator to secure the result with the greatest ease and certainty. In my judgment, the preparation of gold best adapted for this purpose is non-cohesive foil, rather than cohesive gold. The working qualities of these two preparations of gold are widely different.

Two surfaces of non-cohesive gold, when placed in contact, will cohere, if at all, only by great pressure. Rolled into a ball between the fingers, the surfaces easily sliding upon and adapting themselves to each other, the mass becomes hard and unyielding only as it approaches a solid condition. A piece of highly cohesive gold treated in the same manner will weld by cohesion at separate points of irregular distances as they are brought into contact. This welding at separate points soon renders the mass angular, somewhat analogous to a bunch of burrs, clinging to each other in some portions, while separated at others.

There is a difference between a solid plug and a hard plug. A plug may become quite hard, and at the same time be full of openings, which are readily revealed by the microscope. The preparation of gold best adapted for filling teeth is possessed of a pliability and non-cohesive quality similar to kid, silk, or cotton. The surfaces of these materials, when massed and rolled between the fingers, readily slide upon each other, and become hard only as they approach their smallest possible dimensions. A filling, in order to save a tooth, should be a perfect cork and prevent the passage of fluids between it and the walls of the cavity, as a cork prevents the passage of fluids between itself and the nozzle of the bottle. Great labor and care may make a perfect glass stopper, but, owing to its hard and unyielding character, unless fitted with great exactness, it will be useless. The readiness with which the common wood cork can be adapted to uneven surfaces renders it much more available, therefore, for this purpose than the unyielding glass. Cohesive gold as a material for filling teeth is analogous to glass as a stopper. That, with great care and extraordinary skill, good fillings may be made with cohesive gold, there is not a doubt. But that a large majority of fillings made

with it by ordinary dentists are imperfect and comparatively useless will not be denied by any careful observer. The great pliability of non-cohesive gold, and the ease and certainty with which it may be forced into fissures and irregular angles of cavities without clogging or choking, enables the average operator to obtain much better results than can be secured by the use of cohesive gold. The material to be recommended for general use is not that which great skill only can make serviceable, but that which the ordinary or average skill of the profession can make the most useful in the saving of teeth. That the average skill of the profession will be more successful in ordinary operations in saving teeth with non-cohesive than with cohesive gold, I have not a doubt. For this reason non-cohesive gold foil should be recommended and adopted for general use. Dentists of twenty and thirty years ago did not attempt the more difficult class of operations that are successfully performed by our skilled operators of to-day. Their operations were confined to the simpler kind of cavities, and little attempt was made at the restoration of the shape of teeth, —what is known as contour work. The class of cavities then filled with non-cohesive gold by the skilled operators of that time, compared with the same class of operations made with cohesive gold by our average college graduates of to-day, will show a greater percentage of teeth saved by the old-fashioned method than have been saved for the last twenty years by the use of cohesive gold. While these old fillings may have rough and uneven surfaces, the teeth will be clear and free from that blue appearance indicative of decay, so frequently met with at the present day.

These modern dentists succeed in making hard and very beautiful fillings, but it too frequently happens that what at first seem to be splendid successes in a few years prove to be lamentable failures.

Around these fillings the teeth in a few months present a suspicious appearance; later on they begin to turn blue, indicating decay, growing darker and still darker until finally the walls give way. The hard and beautifully polished filling falls out, and the tooth is lost. We frequently find fillings, put in by these old-fashioned operators with ropes of non-cohesive gold, so soft that they can be readily penetrated with a plugger or lifted out with an excavator, the ropes easily uncoiling after removal. Still, around these fillings the teeth present a clear and healthy appearance, without the least indication of decay. I have seen hundreds of these cases, and I doubt not Dr. Morgan, Atkinson, and others of our old operators have seen as many. Now, why is it that these rough fillings, so soft that they can be readily

penetrated with a plugger or removed with an excavator, had so long saved the teeth, while the hard and beautiful fillings of cohesive gold so frequently fail to accomplish this object? Simply because the great pliability of the material enabled the operator, without great labor or force, to so adapt it to the walls of the cavity as to exclude moisture. For these reasons cohesive gold in the hands of the average operator cannot be too strongly condemned for general use in filling cavities of decay, so long as we have in non-cohesive gold a working quality that would render their operations far more certain of success; that, too, with far less labor than is now expended on cohesive-gold fillings. For the finishing of fillings and the building-up of crowns, cohesive gold is invaluable; and, as a rule, its use should be limited to these operations. Should the profession at large adopt this mode of practice,—namely, non-cohesive gold mainly for the body of their fillings, and cohesive gold for surfaces and the restoration of the shape of teeth,—the general results would be far better than are now attained.

Dr. Morgan: I would like the doctor to give us his idea of a perfect filling in all its points,—a large filling on the grinding surface of a molar.

Dr. Allport: You mean an ideally perfect filling?

Dr. Morgan: Yes, sir, according to your mode.

Dr. Allport: You mean a filling that will subserve the purpose of saving teeth?

Dr. Morgan: No; I mean a perfect filling. You were talking about making a perfect filling. I want to get at what you mean when you say a perfect filling.

Dr. Allport: When I say a perfect filling, I mean a filling that will save a tooth the longest.

Dr. Morgan: What sort of a filling is that? What is its condition? what are the factors in the case?

Dr. Allport: The essential factor is that the gold shall lie in absolute contact with the surrounding tooth, the rest is mainly superfluous; and this result can best be obtained with non-cohesive gold. The liability of cohesive gold to draw from the walls of the cavity, and ball up under direct pressure from the instrument, renders it necessary for most operators to make retaining-points at different places in the cavity, in order to keep the gold from tilting or loosening in the tooth. This tilting is caused by a lack of a perfect adaptation to the cavity, and when tilting has once occurred, no matter how many retaining-points may be made, moisture will penetrate

between the plug and the tooth. It is not necessary that the filling should be like molten gold. On the contrary, I believe that if the filling perfectly fits the cavity, it makes but little difference whether the main part of it is hard or soft, so long as its surface is hard enough to resist friction and retain its integrity of finish. In fact, a filling of medium hardness, so long as it meets these conditions, is less liable to undue thermal changes and more compatible with the health of the tooth.

Dr. Barker: I would like to know if the doctor would advocate the use of soft foil in cavities that have not four good walls, and if his method of using soft foil is in the form of cylinders?

Dr. Allport: I use it everywhere until I get near the surface. I then use freshly-annealed cohesive gold for finishing the filling or restoring the shape of the tooth.

A Member: Suppose you had a definite retaining-point, can you build right on to that?

Dr. Allport: I can, generally. Cohesive gold is the most deceptive thing in the world in filling teeth. Its use requires a retaining-point to keep it from tilting in the cavity. It frequently happens that after the gold has been moored at this point, a blow a sixth or an eighth of an inch from its anchorage will loosen it from its fastening, showing conclusively that the gold has curled up under pressure from the instrument and that it rocks because it does not fit the cavity. To obviate this rocking, or to keep the gold in the cavity after it *has* rocked, dentists frequently make several of these points. But non-cohesive gold fits so perfectly to the cavity that retaining-points are less essential.

Dr. Dickerman: Do you use non-cohesive foil in the form of cylinders?

Dr. Allport: If there is a cylinder to be filled there is no objection to the use of a cylinder with which to fill it. I formerly used them a great deal, but do not of late years. I use my gold by tearing it in pieces and rolling it in pellets between my fingers, and as I proceed with my operation use large or small pellets, as the case may require. If the cavity is of irregular shape I succeed better in this way than with cylinders.

Dr. Morgan: The doctor makes a point that I wish to enter my protest against. He is frank enough to say he does not know how to pack cohesive gold, and with it fill a cavity perfectly,—how to get the gold against the walls so as to exclude the moisture from the cavity,—and he assumes, because he does not know how to do it,

that nobody else does. I was taught when I was a young man to use soft foil, and I use it yet to a very considerable extent, but I can assure him, upon the honor of a man, that I can take cohesive gold and fill a cavity as perfectly as I ever could with non-cohesive gold, and I want to enter my protest against the assumption that other men cannot do what he admits he cannot. He has no right to speak for me or for any one else here. When he sees a cohesive filling with dark-blue lines around it, he sees one that has been imperfectly made, and the imperfection was due to the manipulator, not to the material, because cohesive gold is susceptible of being put where any other form of gold can be successfully placed.

I know a good filling can be made with non-cohesive gold. I asked him for his ideal of a perfect filling, but I did not get a direct answer.

Dr. Allport: There is not a perfect filling in the world.

Dr. Morgan: You used the word perfection a number of times, if you will excuse me for being so personal. I understand that no man ever made a perfect filling, in the best sense of that term, but we all have an ideal of a perfect operation, and that is one in which the cavity shall be so shaped that it will retain the gold, that there shall be no decay left in the cavity, and then that it shall be perfectly filled with gold, and that the gold shall be in one solid mass when the operation is complete.

That is the ideal. The nearer we approach to that the better filling we have. If it is soft enough to put an excavator through it to the bottom, it is a very imperfect filling; and while some of them may preserve teeth under certain circumstances for thirty or forty years, a very large majority will drop out in a much shorter time. He said of teeth that were well filled forty years ago that the fillings in the majority of cases are now standing.

That is also an assumption that he cannot demonstrate, and it is one that no man's observation will justify him in making,—if he intended to convey that idea. The truth is, that a very large class of teeth that are filled and preserved with cohesive gold, at the present time, were not touched by our best operators thirty years ago. I know whereof I speak, because I was familiar with the operations of the best men in the profession of that day, and I know that from one-fifth to one-fourth of the operations now made by men who make what I consider first-class fillings, are upon a class of teeth that were not touched by any of those gentlemen.

I know the fact because I have been in many places and examined the patients of our best operators of the present time, and I also

know what a number of the very best men in the United States did in former years.

Dr. Fillebrown: I wish to enter a protest against the assumption that to use cohesive gold successfully it must necessarily be malleted. Such is not the fact. I know of more than one operator who uses cohesive gold habitually, who does not use the mallet for one-twentieth of the fillings he puts in. Cohesive gold may be used with hand-pressure just as thoroughly and well as soft gold, with a great deal less pressure and much less danger of injuring the teeth.

Dr. Allport: Why?

Dr. Fillebrown: Because it does not take so many pounds of pressure to thoroughly cohere the cohesive gold as it does to press the soft foil to place, and the less the pressure used the less danger of injuring the thin wall of a cavity. In using cohesive gold there is no necessity of drilling retaining-pits; it can be held to one part of the cavity while it is being built across and supported against the opposite walls, just as readily as soft gold can be. I am one of those who do not pretend to use soft gold as skillfully as some who have used it many years. But I know cohesive gold can be used just as successfully as soft gold. And while it requires twelve to fifteen pounds' pressure to condense a soft-foil filling, three or four pounds is ample to make a perfect cohesive plug. Properly prepared, it is so malleable it will go home to its place not only by laying one lamina upon another, as soft gold will; but it can be moulded to the cavity by change of form just as a piece of Fletcher's cement can be. When cohesive gold can be used to such perfection and success, we should use it. I know of cohesive fillings that have remained twelve and fifteen years without change of color, and every way perfect so far as could be observed. This is just as good evidence that cohesive gold is a good material for filling teeth, as that soft gold is a good filling because some teeth have been preserved so many years by fillings very imperfect in the beginning.

Dr. Thomas: No two men have the same perceptive faculties, no two men will fill a tooth alike, and at the same time we are all aiming to produce like results. No two physicians in the treatment of disease will treat just alike. If they do, it is a coincidence.

It seems to me that the practice of entering protests against any man's mode of operation is folly. I, like Dr. Fillebrown, do not pretend to be a skillful manipulator of non-cohesive foil, because I was not educated in that school. I came into the practice of dentistry about eighteen years ago, and at that time we were just entering

upon the use of *co*hesive foil—and the dental profession, when they take hold of anything, it is with a *vim*—and it seems to me now, in looking back over that length of time, that when the dental profession took hold of cohesive foil, they left out of sight *altogether* the use of non-cohesive foil; they ran wild over the subject, and they have run wild over a great many things since then.

I can see men sitting before me who ten years ago at least used nothing less than No. 20 foil; some went as high as Nos. 240 and 260,—made all their fillings chiefly of that kind of foil.

The men are here to-day, but they do not operate in that way now. They are gradually getting back to old-time principles, as Dr. Fillebrown has expressed it, when he says the mallet need not be used with cohesive foil.

I think so, too, in the majority of cases, but Dr. Fillebrown used it more five years ago, if at all, than he does to-day, and five years ago he used a great deal more pressure, if he did not use the mallet, and he is using it less and less. I will make that assertion, that he uses it much less to-day than he did five years ago, because I believe him to be a careful, conservative, and progressive dentist.

Dr. Fillebrown. Say ten years ago and I will agree with you.

Dr. Thomas: I have occasion frequently to see fillings that were made thirty and thirty-five years ago of non-cohesive foil, by a neighboring practitioner, that are saving the teeth to-day just as well as they were one year after they were made; and, as one gentleman has said, you can take an excavator and push it clear through many of these fillings.

The fillings must be leaking and at the same time the teeth are preserved. That means something. I do not advocate filling teeth in that way, but at the same time the object he sought to attain has been attained. 'Tis true, as one gentleman has said, they did not attempt to fill teeth in that day that we do in these days of modern improvements. The teeth that there was any doubt about saving were extracted. But it seems to me that there is a middle ground in this matter of gold and the way it should be prepared for filling teeth; and I think that Dr. Allport made a good point when he said that in the use of cohesive foil "the more you work it the harder it becomes." It becomes, as it were, a bunch of burrs, stiff and hard, and it draws away from the margin of the cavity the more you work it, unless you put upon it that very fine work that few men can do without encountering the liability of fracturing and checking the enamel walls of the cavity. And this is a point I wish

to make conspicuous,—the liability of fracturing the walls of the cavity by the force (mallet or otherwise) that is often necessary to put cohesive foil where you want it.

When you put your gold plate between the dies to swage it, you heat it to make it as soft as possible, but just as soon as you strike it, it becomes harder, and the more you strike the harder it becomes, and in its hardened condition, under your hammer it springs, curls, and twists. But, fortunately, the way out of the difficulty is easy: re-anneal it, place it between the dies, and give it a gentle tap or two, and it yields gracefully. In the use of cohesive gold the pressure or force used should be just as light as possible to produce the desired results.

The working of gold is not unlike the management of individuals: persuasion conquers where coercion fails.

We all know that there is such a thing as filling a tooth in what we call a perfect manner with cohesive foil, but there are such a variety of cavities, such a variety of instruments, and such a variety of men, their way of manipulating is so different, that it is very seldom that a filling is what we would call an ideal one, made of any kind of gold. Let us not, in our desire to make beautiful fillings, lose sight of the fact that the *tooth* should be our *ideal*, and not the filling. With the use of cohesive foil we were taught that retaining-points were necessary to make the filling retain its place, but it is very seldom that I now use a retaining-point. If I can't make a filling without a retaining-point I am pretty sure I am making a poor filling, and I think that cohesive gold is very deceptive, and its use in the hands of young operators I believe is productive of a great deal of mischief. I believe a young operator ought to be taught to use non-cohesive gold first. If a man can use non-cohesive gold, you may put cohesive gold into his hands and he will do a great deal better service with it than he could do without the knowledge of the working properties of non-cohesive gold.

Cohesive gold, under force, will draw towards the centre of itself. In many proximal cavities where the walls are frail, the pressure required to put the gold in proper place is liable to injure the walls of the cavity, and if we were to examine with a microscope many of the enamel walls which appear, after the filling is completed, perfect to the naked eye, we should find that the enamel is full of checks produced by the action of the mallet.

It is true you may take a simple cavity in a molar, a cylinder, as some gentleman has expressed it, and you may pack your gold, using

as high a number as 240, putting on great force with the mallet, and when you have got through you will have a good plug; you can risk it there, but you cannot risk it in marginal walls, where you need to exercise the greatest care, and where non-cohesive gold should be used.

Cohesive gold is softer than non-cohesive. It is not because it is so hard that we cannot use it easily, but because just as quick as one crystal touches another crystal it will adhere and curve, curl and twist, and that is where the trouble begins. If we should teach young students the use of non-cohesive gold first, they would not have so much trouble with fillings leaking around the margin.

Dr. Taft: In discussion of the subjects presented for consideration before this body, it would be well if special pleading could be avoided, and the ascertainment of the truth be made the chief aim. There are different opinions and shades of opinion upon almost every subject held by different individuals, and the subject before us is not an exception in this respect.

Still, it is a matter of surprise that men who have been in dental practice for twenty years and more, and for most of that time actively prominent, should say that cohesive gold *cannot* be adapted to the walls of an ordinary cavity sufficiently well to exclude decay-producing agents. If in this statement the ability of the speaker only is intended, it may not call forth a denial. But if all are included, an earnest dissent must be recorded.

Dr. Morgan has just well said, "I will not allow any man to say what I can or cannot do in that respect; he may speak for himself: I claim the same privilege."

Experience shows me conclusively that ordinary cohesive gold, in good condition, can be as perfectly and as easily adapted to the walls of cavities as non-cohesive.

Dr. Goddard: By you!

Dr. Taft: Yes, and by a great many other dentists. I know it can be done, and that it is done by many operators every day.

It was stated here a while ago that men were in the habit a few years ago of using No. 220 in common practice. I have not known of such practice, though I know that some experiments were made with gold of that thickness. I know, however, that a great many use foil of Nos. 20, 30, 40, and 60. Some of the best operators in the world use No. 60 foil, and scarcely anything else. I see the operations of these men frequently, and they will stand the test with any other fillings that are made anywhere or by anybody, or any soft-foil fillings that were ever made.

Many of these fillings of heavy foil, too, are put in places where soft foil could not be used, and have saved teeth that soft foil never could have saved. I will accord to soft foil all that belongs to it. I know that simple cavities can be filled with it so as to preserve the teeth. It was stated here to-night that fillings of soft foil that can be easily pierced with an excavator will save teeth from decay. For every case of this kind, you can find one in which decay has ceased without filling of any sort, and remained so for years. I will find one case of the latter character for every one of the former that may be presented. A great many cases of filling, perhaps a majority of those that are now attempted, are such as would have been rejected when only non-cohesive gold was used.

All the circumstances and conditions attending the two methods should be taken into account and fairly estimated, in order to arrive at just conclusions in this matter. The objections that are brought against the use of cohesive gold impress me that either the objectors have defective instruments, or that they do not know how to manipulate the gold or use the instruments. If any one has properly-formed instruments, and will use them with a moderate degree of skill and intelligence, he will not meet with the difficulty named. As to retaining-pits: what is the great objection to having an angle, pit, or depression somewhere in the cavity that will retain firmly in position the first portion or portions of gold that are put in? Why should such anchorage not be made? Have we heard any good reason against the practice? One speaker says, "You will fill up a pit and add on gold, and by and by it all breaks loose, and you lose the adaptation." I pity the man who has that experience. It shows a mistake somewhere,—a want of ability in manipulation. Very frequently it is sufficient to place gold in the cavity and hold it with the instrument in the left hand until it is fixed in place. But what is the objection to an angle, such as is sometimes made, as an anchorage point, sufficient to retain the first portion of gold firmly in position? I regard it as a very important matter. It leaves the left hand free with which to do anything else you desire about the mouth. The ordinary method of stuffing in gold and holding it with an instrument until the cavity is filled up is a faulty method of operating, as far as cohesive gold is concerned at least. With the latter it is well to have the first portion fixed in place, and to build on from that, and there is no occasion for the gold moving from its position, whether you use cohesive or non-cohesive gold, where it is first properly adapted.

I desire to correct what seems to me to be a mistake in the state-

ment made by Dr. Fillebrown. He stated that with less hand-pressure cohesive gold could be better consolidated than non-cohesive. He did not state, however, that ordinarily with non-cohesive gold a far larger mass is placed under the point of the instrument than when cohesive gold is used. If the same amount of material is placed under the instrument, I do not conceive that there would be very much difference in the amount of force required to condense the two kinds of gold. Now, as to the gold "burring up" and getting into the shape referred to by Dr. Thomas. What does he mean by "burring up"? Does he mean that gold having been stuffed into a cavity rolls up into a ball when the attempt is made to consolidate it by direct pressure towards the bottom? I do not believe he gets that result when he uses good cohesive gold. But bear in mind that cohesive gold is a very different thing now from what it was at one time, or from what some preparations of it were at one time. I have seen gold so harsh and hard that it was very difficult to manipulate; but with the best forms of gold of this kind now there is no difficulty. I use non-cohesive gold, I use everything and anything that is best adapted to the case.

It frequently occurs that cases of early operators are presented where teeth were saved by the use of non-cohesive gold. I have seen—see them frequently. They do exist. We all concede that. What of it? A great many teeth have not been filled that were decayed twenty-five or thirty years ago. The progress of decay was arrested at that time, and they have remained without apparent change since. This result was brought about by an improved condition of the mouth.

The idea would seem to be conveyed by the discussion that in a majority of teeth filled with cohesive gold, very soon—in a few years at least—defects occur, dark shades appear around the fillings, and decay is the common result; that this is the rule in cases of teeth filled with this form of gold. I do not find it so. If you say you have occasionally found cases so, I will admit that, of course. But that it is the rule, I deny.

Dr. Thomas: The doctor wanted to know what I meant by gold rolling up and having a burred appearance. If you will take two pieces of gold that are cohesive, and put them together and put them in the palm of your hand, and roll them about carefully, you will get (with a fine sense of touch in your fingers) a roughened appearance. The more you roll it the harder it will be, and the more little prominences there will appear on the surface of that gold. Is not that so?

Dr. Taft: I do not know.

Dr. Thomas: I know it is, and the more you attempt to separate that gold the more it will assume that burr-like shape; but the crystals of non-cohesive foil do not burr, and when you attempt to separate the mass it can easily be done. Besides, the more you roll it in your hands the smoother it becomes. The point I intended to make was, that owing to this property of burring up, cohesive foil does not perfectly seal up the ends of the tubuli.

I was gratified to-day to hear that old gentleman who has been in the practice of dentistry fifty years give us such a clear explanation of the reason why we find so many fillings with decay around them, —viz., that the ends of the tubuli were not properly sealed up. There is where the leakage comes in. It comes in from the pulp, from the inner part of the tooth, and when you use cohesive gold there is the greatest difficulty in holding it so it will not draw towards the centre, thereby leaving the ends of the tubuli open to exude secretions from the pulp. I am not pleading for the exclusive use of non-cohesive gold,—far from it,—but for a calm and careful consideration of the best preparations of gold for the saving of human teeth.

Dr. Atkinson: If we as a rule felt more interest in our meetings, and less disposition to scatter ourselves about, and feast ourselves in other methods, it would be better for the Association.

It has been said that all the disintegrated portion of the dentine must be removed to secure good results.

That is directly the reverse of good practice. It is directly the reverse of truth. In taking away all the disintegrated dentine you may expose, or nearly expose, a pulp.

How should we teach young men to fill? By being honest enough to let them stand over us in our best efforts upon our most-loved patients, and see just how we do it, and not send them unprepared to get a "D.D.S." or any other cabalistic nonsense attached to their names, without understanding its significance.

Let them be trained by the side of the man who has been illuminated as to the principles and the practice, and let him prayerfully —yes, I mean it, *prayerfully*—ask for help that he may remove the darkness, that the pupil can see as well, if not better, than he sees the principles and the practice.

Much has been said about the materials that are used. Let me say, it is my opinion that the material has very much less to do than the knowledge of principles and the mode of manipulation. Many materials that have run well for a season have proved deleterious in

the hands of operators, eminently Fletcher's Oxyphosphate of Zinc, Weston's Oxyphosphate of Zinc, and others of the same kind. Had those who manufactured them understood the chemistry involved, or had those who used them understood it, this difficulty need not have occurred as a result of the deterioration of the specimen that worked well when first opened.

No one can fill well without inspiration, or understand it all at the first effort; hence the propriety of our examining as thoroughly as we can the conditions of the material that we use.

It has been said that almost any one can make a cavity tight on its margins. Almost nobody does. If the cavity be properly prepared, all this friable condition of the enamel that has been spoken of as being checked up by the use of the mallet or other mode of force brought to bear upon it, will be obviated. We will have no difficulty if we understand how to prepare the cavity, and I pity the man's conscience, or lack of conscience, who will allow a filler to strike an enamel edge. He is not fit to be a student of dentistry even, much less a practitioner. All the differences of view that we have result from the difference of illumination, for truth is one, and this averaging it, as some have done, I just go against as dead as I do against averaging that ten times ten is not a hundred. It is either a hundred or it is not.

Dr. Morgan: What about tubuli pouring out their fluid?

Dr. Atkinson: I was pained to hear men that had common sense enough to eat their dinner say that disintegration could take place without a disintegrant—that is to say, without the presence of something that holds a greater affinity for some of the elements of the tooth structure than these have for each other—when there was an absolutely sealed cavity! It is an entire misapprehension of the facts of the case; and the person who entertains that, simply needs to be warmed into common-sense views. What is the condition of a normal tooth? Every dentinal fibril is full of protoplasm as long as the pulp lives.

So short is the time, and so unwilling am I to go into the mere *finesse* of detail, that I rather desire to keep to principles, and I wish to say this: that there has been much misapprehension on the subject of transplantation and replantation of teeth that would be entirely wiped out of the minds of dentists if they would study comparative embryology and histology, by which they would get rid of a great deal of mass-generalization and jumping at conclusions, and have some square, common-sense views about what

does take place in such cases. I have seen the advocates of this kind of practice that were not fine enough in their perceptions to select a tooth that you could not distinguish as false at twenty feet from the patient, and then present it before a society as a success, with a fistula discharging by the side of the tooth where no connection had been made, and counting it as good as new. Brethren, study embryology, study histology, and when you have got those well in your minds you will comprehend pathology and therapia.

Dr. Friedricus: There is one point in the discussion of this subject that, in my estimation, has been entirely overlooked. To gold and its proper manipulation has been given, without exception, the credit of preserving the teeth after a lesion has once occurred, leaving out altogether the important action that the inherent forces of nature set up, the moment the life of this organ is endangered, to counteract destructive tendencies. We know, and I can bring authority to sustain my assertion, that whenever a tooth is attacked by caries, calcification of the dentinal tubuli ensues, and in many cases succeeds in arresting the further progress of decay. Magitot calls this "dry caries." This condition, whenever brought about, offers a better protection, as it is nature's cure, than a filling of gold can possibly effect. Now the query arises as to the cases cited by members of this Association of fillings of gold through which an excavator could be run with ease, and which could be picked out without much effort, and which have stood the test for forty years, whether or not there were other causes to which might be attributed the arrest of the decay beside the mere filling up of the cavity? For it must be granted that the material employed for filling must be, to all intents and purposes, unchangeable by the fluids secreted in the mouth; secondly, it must be impermeable to the fluids, as well as to other substances that are brought in contact with it in this cavity. Therefore I cannot, having these facts before me, realize how a filling, such as those represented in the cases cited (that we must suppose to have been permeable by the fluids of the oral cavity), unaided by the inherent forces of nature, could have been the only factor in the arrest of the progress of decay. Soft foil, or no soft foil, it is my opinion that the vital force had a share in it. I was under the impression that this gold-foil question had been settled to the satisfaction of every member of this Association, and for this reason, that it has been, and is daily, demonstrated before our eyes that teeth are equally as well preserved, whether the material employed is in the form of crystal gold, of cohesive or of non-cohesive gold foil. We must then conclude

that it is not any inherent quality in the gold itself which insures success,—rather the skill with which it is manipulated.

Dr. Benjamin Lord: I think that is the thing in a nut-shell. It is not the kind of gold, to a very great extent, but, as one has said, it is the power behind it.

None of us question but that teeth can be filled with cohesive gold, and filled so as to be well preserved, and none of us question but that teeth were filled, long before cohesive gold was introduced, with soft or non-cohesive gold, and were well preserved. Hence it must follow that it is not so much owing to the inherent quality of either that the required result is reached as it is to the proper handling of the material, the manipulation. The great and important question is, which can be used to the best advantage; which can be used with the greatest simplicity and certainty; which can be most readily and surely adapted to the walls of the cavity, and be made sufficiently solid to exclude moisture and all agents that would cause decay around the filling.

I firmly believe that soft or non-cohesive gold has the advantage in all simple cavities,—cavities having four walls,—and very often in cavities of three walls.

Of course, if we are to make contour fillings, or if we wish to extend the metal beyond the edges of the cavity, we must use cohesive gold, either wholly or in conjunction with soft gold.

But in all plain, simple cavities, as I said, I do not think there can be any question but that soft gold should have the preference, and for philosophical reasons. It is more plastic, not, perhaps, as we begin to manipulate it, but its plasticity is maintained as it is placed and packed in the cavity, whereas cohesive gold becomes hard and unyielding at once as we begin to work it. While I am aware that some who use this kind of gold make most excellent operations, yet my long experience and observation convince me that the great majority of dentists do not and cannot use it with the success that they would non-cohesive.

It has been said at this meeting by two of the advocates of cohesive gold, that when we see teeth that have been preserved by the use of non-cohesive for from twenty to forty years, those teeth would not have required filling at all. I think that assumption is not warranted, nor is it any argument in the case. Suppose cohesive gold had been used, would the same teeth have required filling or have done any better, or would the results have been any different?

Dr. Stockton: If I were a student of dentistry, and had come to the American Dental Association, as the great light of dentistry, to learn how to fill a tooth, I think that I should go home not knowing much more than I did before I came, because of the many different methods advocated. Some gentlemen who were educated to use soft foil, in attempting to use cohesive foil make a failure of it. Others, who were educated in the use of cohesive foil, having been persuaded that soft foil is better, in attempting to use that make a failure. I think we should know how to use them both. I believe that teeth can be saved sometimes with soft foil that cannot possibly be saved with cohesive foil, and I believe that teeth can be saved with cohesive foil that cannot possibly be preserved with soft foil.

A gentleman said to me, last night, that soft foil breaks up under his instrument. This would indicate that he does not know anything about using soft foil. I was first taught to use soft foil, but I would not like to be confined exclusively to its use. I believe they both have their uses, and that they both can be employed successfully in the *same* operation.

Some think that cohesive foil cannot be united to soft. I do not think that is true.

Some as good fillings as I have ever seen, in teeth that are being preserved, were made largely with soft foil and finished with cohesive.

I have in my mind now a case that came from a city in the West. The operator is one of the best, and yet the fillings, which had been made with cohesive foil, had failed. The teeth were afterwards filled by another gentleman from the same city, and in about one-third of the time, with soft foil, capped with cohesive, and, if I am any judge of fillings, and am able to forecast their future, I think that those teeth will be preserved.

The time expended in doing the work has a great deal to do with this matter of filling large cavities. With two sheets of No. 5 non-cohesive foil, where you have four good walls, you can fill a tooth in one-third of the time that you can do it with cohesive foil alone, and make the operation just as successful.

There is another point I wish to mention, which was referred to in the paper which, I think, was read yesterday. There is a great deal of fault found with the prices we charge. I think dentists are a good deal at fault there. If we would sustain one another better than we do there would be less fault found by our patients.

I think that we should do everything that we can to encourage the saving of teeth.

I was present some time ago at an association, where a gentleman said it was a blessed thing to get rid of our teeth; it was going through torture to have our teeth filled, and it was better to have them extracted with the aid of an anæsthetic, and then replaced with a good set of artificial ones.

I do not believe in such nonsense. I believe God gave us these organs, and I believe we are his co-laborers and co-workers by saving that which he has given us, and let us do all we can to save the teeth that are entrusted to our care.

Dr. Cook: We hear gentlemen say a great deal about saving teeth; that some forms of gold will save under proper manipulation, and that other forms will not. From what cause do fillings fail? Is it from leakage or from new decay starting around their borders? As beautiful fillings as I have had the pleasure of seeing I have found undermined by new decay. This was not the fault of the operator, it was the fault of the patient in not keeping the spaces cleansed. Decay, having once attacked a tooth at a certain point, is likely to occur again in that vicinity, unless other means than mere filling are employed to prevent it, no matter how carefully the operation may have been performed. The general fact that decay is liable to occur around the best fillings in many cases has been often stated, and as often admitted, by our best operators. The cause of such decay has not, it would seem, received that attention in our discussions its importance merits.

One word in relation to discussing the question of fees in our dental associations. It is not, so far as I am aware, a subject for discussion in medical societies. I am not informed that artists are in the habit of discussing this question of "fees" at their meetings. If one can do a thing properly, and certainly if he excels, he will have sufficiently appreciative admirers, with purses deep and well filled, willing to give him all his merits deserve. I think it is not a proper subject for discussion here.

Dr. Allport: As this discussion seems to be in part based upon remarks that I made last evening, I will say that speakers assume to put words in my mouth that I never uttered, expressing sentiments that I never entertained,—namely, that good fillings can only be put in with non-cohesive gold. I said distinctly that our most skilled operators could put in good fillings with cohesive gold, but that the average skill of the profession was not up to that standard; that for filling the cavity of decay non-cohesive foil could be used with greater certainty of success; for restoring teeth—building up crowns

—of course cohesive gold must take the preference. In discussing this question please bear that in mind.

Dr. Webb: The success of an operation depends more on the ability of the operator than on the material used or the means employed. Cavities of decay may be divided into three classes: those in the grinding surfaces or in the fissures of bicuspids and molars, those in the buccal or labial surfaces, and those in the proximate surfaces of the teeth. In deep-seated cavities, or in those cases where the pulp is nearly or quite exposed, some discolored dentine should be left for the protection of this tissue, and in all these cases carbolic acid ought to be placed in the cavity to disinfect the carious dentine and coagulate the protoplasm weeping from the fibres of living matter in the exposed dentinal canaliculi. After this has been done, oxychloride of zinc should be placed in the cavity to act as a non-conductor of thermal currents after the gold filling has been inserted. Not only should oxychloride of zinc be used for that purpose, but quite a portion of each large cavity in the crown of a molar had best be filled in that way. It is far better to do this than to endeavor to so place cylinders and pellets as to get close contact with the walls of the cavity. After filling such a cavity up to near the inner surface or first layer of the prisms of the enamel, or, in other words, covering the whole or nearly all the dentine with oxychloride of zinc, enough of this preparation should be so cut away after it has hardened as to get proper and sufficient anchorage for the gold.

I am speaking now more particularly of crown cavities. A starting-point should then be made, if one of the fissures will not serve the same purpose. I do not approve the practice of making so-called retaining-points to hold the filling in place, but a point to start the filling in ought to be made in all cases, so that as the pieces of gold are put in position they may remain just where they are placed. Not a single piece of gold should move. If movement of gold takes place after it is put in position, whether that gold be the so-called soft foil or any other kind, the operation cannot but be imperfect in some degree. It has been stated that fillings can be inserted in less time and with less effort with soft foil than with cohesive gold. That is not the case if cohesive foil be properly used. If large cylinders be used, there is no question but that those of so-called soft foil can be pressed against the walls of a cavity more perfectly than the same cylinders of cohesive foil, but that is not the way to use any gold. Those who speak of soft foil do not say whether they mean absolutely non-cohesive gold, or foil that becomes cohesive by annealing. All

pure gold is cohesive, and difference in purity makes difference in degree of cohesiveness. If gold is non cohesive, there is something on its surface to make it so; such gold should not be used, even in the sulci and fissures of bicuspids and molars. There ought to be cohesion between the particles of gold, so that there may be no scaling off as the patient advances in age, and the grinding surfaces of the teeth become abraded. Heavy foil, especially Nos. 30 and 60, can be, and is being used with entire success, but neither it nor any other preparation of gold should be touched with the fingers, nor be brought in contact with moisture in any way. The teeth that were filled with soft foil thirty or forty years ago, and still remain in place, have become more dense in structure, and most such teeth would not have been lost even had such cavities as were in them not been filled. Many operations are performed to-day that were not attempted at that time; and if we examine the fillings that were carefully inserted then, and could see the operations that are properly performed now in similar cases thirty or forty years from this time, we should find that such fillings do better and look more perfect than those operations performed twenty or more years ago. Cavities within the buccal and labial surfaces should be filled in about the same manner as those in the sulci and fissures, but when the proximate surfaces are disintegrated, and particularly where parts of the enamel are broken away, there, unquestionably, cohesive foil is the only proper gold to use. In such cases, as in others, there should be some point to retain the first pieces or narrow strips of foil, and to keep them there as the grooves or anchorages are reached and filled, and the whole operation is completed. As to decay recurring about fillings in cavities in the proximate surfaces, I would say that in all those cases where calcification is imperfect, it is necessary to cut away tissue well out towards the buccal and palatal or lingual surfaces, and towards the neck of the tooth or a little beyond the margin of the gum, and so restore the contour of the parts that the margins of enamel may be free from contact with the adjoining tooth, and be kept so by the prominent portion of the gold so resting closely against, or so knuckled up to the tooth adjoining, near the masticating and buccal surfaces, that food cannot wedge between the teeth. If such an operation be well performed, and the margins made free, these edges of enamel will be kept clean by the movement of the tongue, or the washing of the fluids in the mouth; the gum protects the cervical wall, and decay cannot well recur.

Dr. Wetherbee: I wish to enter my caveat against the assertion

that cohesive foil cannot be used for the perfect filling of all cavities in the teeth where gold is indicated. It is not true that unannealed foil in the form of pellets or cylinders can be more perfectly pressed against the walls of a cavity than can cohesive foil in the hands of an operator of fair ability; nor is it true that teeth can be preserved longer by unannealed than by annealed foil. A filling made of annealed foil, if perfect, is a perfect filling; so one made of unannealed foil, if perfectly made, is a perfect filling. The object of filling teeth is to exclude all moisture.

The three-hundredth or the five-hundredth part of an inch between the filling and the walls of the cavity is fatal. The unassisted eye cannot detect so minute an imperfection, that may exist and prove the origin of future trouble. It matters not whether you fill with unannealed foil or with annealed foil, operations upon the third quality of teeth will fail in the course of time in the hands of the best operator. Why? Because the dentinal tissue is vulnerable, and is again permeated insidiously at the margin of the gold by the fluids of the mouth, and a new cavity is formed.

Advocates of unannealed foil would say that this recurrence of decay was owing to an imperfect filling because annealed foil was used. I object to any such conclusion. I have seen fillings of unannealed foil from the hands of the best operators in the United States, and have recognized in those fillings the want of a respectable accomplishment of the ends sought to be attained. I have seen fillings from some very excellent operators through which you could easily carry an excavator, and yet the teeth were not decayed. What does that prove? Simply that in those teeth the tissue was good and the fillings kept out the majority of swamp-angels, and what few were allowed to hold saturnalia there had not sufficient force to carry the day.

Now, with reference to impaction of cohesive foil. Very often the dentine at the cervical wall may be bruised or partially broken by too heavy a blow of the mallet or too heavy a pressure with the hand-packer. Whenever that is done,—and it may be done unconsciously,—you then may look for an immediate recurrence of decay.

In proximal cavities that are deep-seated I invariably use semi-annealed pellets. If there is any doubt as to my holding them in position, I make a small retaining-pit and fill with cohesive foil. To that is added at a certain time cohesive foil that is held in position with the left hand while my mallet-packer is held in the right hand, and it never moves if I have taken the precaution to build up my

retaining-pits sufficiently high. I know whether in carrying my gold up it moves or not,—I ought to know, if I do not; and then the pellet is so made that we have the gold laminated, surface lying upon surface, instead of having the ends driven down and the lamination of the gold destroyed. It is thus made tough and strong, and stands out beyond the periphery of the cavity. When the work of impaction is finished, by carrying a burnisher upon it with some annealed foil until it is burnished down thoroughly against the periphery, any chance for the ingress of the fluids of the mouth is prevented. Why? Because at the periphery the gold with heavy burnishing is slightly expanded and carried against the wall of the cavity.

Permit me to say here, not egotistically at all, I have very little trouble with teeth decaying at the cervical wall after I have filled them. I deem it proper to say that all the gold used in my practice comes to me unannealed. It is made into pellets, cylinders, or ribbons while in an unannealed state. My pellets and cylinders are semi-annealed,—*i.e.*, the surface is annealed, leaving them in the softest or best non-resistant form.

Sometimes in the third class of teeth decay at the cervical walls will recur after the most perfect filling. It cannot be denied that fillings made of crystal gold have stood twenty and twenty-five years with not a scratch upon them, so far as the margins are concerned with no appearance of decay, and with no sign of turning blue.

Gold is a very good material in an intelligent man's hands, but it must be used intelligently; the way should be kept clear, properly adapted instruments used, and then success may easily be attained. It is allowable always to use unannealed foil, if you have not the room you want for cohesive foil. It should be carried in small pieces into the places inaccessible to cohesive gold, and there packed so that every part of the cavity shall be well and thoroughly filled, the gold being impacted against the wall of the cavity. It cannot be done, say some of our leading and respected friends. With all due respect, when they shall have been instructed in the method of impaction of gold and the use of instruments, they will change their minds.

Dr. Mills: I cannot agree with the idea of Dr. Stockton that a young man could have listened to this discussion and not know what is going on. It depends upon the young man's judgment. Taking into consideration the auxiliaries that are brought to bear in regard to the salvation of teeth, I think we cannot claim that gold,

the kind of gold, nor even the ability of using it, covers the entire ground.

According to my judgment, but one man has struck the keynote of the salvation of teeth, and I am very glad to indorse what Dr. Cook has said in regard to the matter of cleanliness. I regret to see how little attention this matter has had in our Association.

Give me a man that has an earnestness in regard to the health and cleanliness of the mouth, and that man will save more teeth than the man of better ability who ignores that department. I am surprised to see so many patients as I do coming from the hands of men of ability and judgment, who show so little evidence of understanding the necessity of cleanliness. It is an exception that a patient comes into my hands that I have never seen before where I find any marks of an effort in that direction. It is the coming men that are going to take hold of this question.

I agree with Dr. Allport in what he said last night. I think I got the spirit of what he meant. I have only this fault to find with his remarks: My impression was that such remarks from a man of his ability would seem to be giving encouragement to a sort of loose, easy way of filling teeth. He denies that; but they impressed me in that way as he made them.

I do not undertake to deny that unannealed gold does not have its purposes. I have used heavy gold, and have found it a success, according to my idea of what success is. There is a mistaken idea that it is necessary to use great force in packing heavy gold. I do not disturb my patients in its use any more than other men do in using light foil. I recognize differences and individualities in men. I agree with Dr. Lord. I cannot denounce men's methods when I see good results. I have to say in closing that cleanliness is the bottom plank of success in the salvation of teeth.

Dr. Niles: As a young dentist I want to get at some facts. I have heard a great many radical statements. Some can fill teeth better with cohesive gold, and others with soft gold.

The main point to be attained, as I understand it, is to make a perfect stopping. It seems to me that it can be demonstrated, by very simple experiments, which will do this best,—cohesive or non-cohesive gold.

Let a certain number of dentists who claim that they can secure better results with non-cohesive gold fill cavities in teeth out of the mouth, and send them to a person who will immerse them in a solution of carmine for a year. Let an equal number of those who claim

the superiority of cohesive gold do the same, and send their teeth to the same person, and see which stopping will most thoroughly prevent the encroachment of this carmine water.

It seems to me in that way we can get a definite conclusion in regard to cohesive and non-cohesive gold stopping.

Filling cavities in steel and ivory and applying the same tests does not, in my opinion, meet the conditions.

Dr. Waters: When a tooth is filled the work of the dentist is not all done; a word to the patient must be said in regard to that work, and his or her duty in caring for it, for the result of dental operations depends as much upon the patient, I think, as upon the operator.

I have been in the habit of demonstrating to my patients, by means of the microscope, how imperfectly they cleanse their teeth.

I had not been in practice more than two or three years before I felt with great force the importance of this subject.

A young man came in to have his teeth cleansed who had no idea of cleanliness, who never used a tooth-pick, nor even rinsed out his mouth. He had noticed a set of teeth that I had cleansed, and thus his attention had been called to the matter. I felt that by performing that operation I should be throwing away my time and his, and that, eventually, he would lose his teeth. I thought I could do him a better service by saying something that he would never forget,—that would shock him and arouse his pride. I said, "Young man, my friends all think I am a very kind man, and I mean to be. Now, I have many patients who are very particular, who want my fingers to smell clean and sweet, and so I have to wash and scrub them after I handle a patient's mouth. I do not keep a cow, because I might be called upon to milk her, and if I did it, it would take me too long to get rid of the bad odor. If I cleansed your teeth, it would take too much of my time to get my hands in proper condition after it; and, although I am said to be a good-hearted man, I do not pretend to be any better than God Almighty, who is said to help those who help themselves. Let me see that you have some idea of cleanliness about your mouth, and if there is anything you can't do, come to me and I will help you out."

I did not know how deeply I had struck. The young man got up, and in a very modest way begged my pardon, saying he did not mean anything out of the way, and bowed himself out. I said, "You are all right, except you are all wrong in not taking proper care of your mouth. Go to work, and do not forget what I have said." "Oh, no," he said, "I shall not forget it." I did not see him again for

twenty-five years. One day, at Newton, a man stepped up to me and said, "Would you like to look at a set of teeth?" I said, "I would; if you have a set you would like to have looked at, I will see them if you will come to my office."

He replied, "It is not worth while to do that," and opening his mouth said, "Just look in here." The crowd gathered around, curious to know what was the trouble. I looked, and saw the most beautiful set of teeth I had ever seen,—teeth perfect in form, not a discolored one in the whole set, and the gums perfectly healthy. I said to him, "My dear sir, I am *very* much obliged to you. I did not suppose there was a person in the world that had such a set of teeth as that. They are a credit to your dentist." He said, "I have not got any dentist." "Then," said I, "they are all the more credit to you." He replied, "You may well say that. I take credit for that job, and I feel proud of it. Look here: you don't think it would make your fingers stink to put them in that mouth, do you?" I said, "Oh, no; what do you mean?" He asked, "Don't you know me?" I said, "I don't know that I ever saw you before." He replied, "I never shall forget you. I went into your office twenty-five years ago to get my teeth cleaned, and that is the way you met me." And then he repeated what I had said, recalling the facts to my memory.

The point I wish to make is, that when patients come to me with what they call imperfect work I say to them: "Acids are the cause of this; your mouth is in an acid condition; the gums show it; the mucous surfaces between the teeth are dissolving away by the acid. How do you live, and on what do you live? Are you not ministering too much to your tastes?—eating pastry and a thousand and one things that you should not?"

I say, no matter how good a filling may be, if the patient does not take care of it, it is liable to fail. A poor filling will do better service with care on the patient's part than will a good filling without care.

Dr. G. H. Wilson: A great many fillings fail, perhaps, by reason of the shape of the cavity. In filling an undercut we can, by hand-pressure, do it with comparative ease, whereas if the mallet be used at this point we should probably have a failure.

We need to be careful in the shapes of our cavities with reference to the kind of filling we wish to put in. Where there is a deep undercut with strong walls, by filling the undercut with phosphate of zinc or some other plastic material we can render the cavity of such a shape that all points can be reached without difficulty.

SECTION V.

Anatomy, Physiology, Histology, Microscopy, and Etiology.

Report on Anæsthesia, by W. C. BARRETT, of the Section.

ALL through the centuries of time man has been endeavoring to find some way of escape from the penalties of broken law; to avoid the pain naturally consequent upon disordered function, or the lesions produced by accident; but until the nature and action of the so-called anæsthetics became known, his efforts were futile, or at the best but incomplete.

There are a number of different states which may be induced in which, while the condition remains, patients are insensible to pain, such as coma, syncope, anæsthesia, and sleep. The first three are pathological; the last is the normal condition of recuperation and recovery of wasted neural force. All these phases or conditions depend upon the nervous supply, and are induced by normal or abnormal nerve-currents.

There are certain drugs whose office seems wholly connected with the nervous system. Of these are nervous stimulants and sedatives, and a distinct class which are denominated anæsthetics. The mysteries of nerve force or of nervous supply have never yet been bared to human knowledge. We experiment and deduce so-called laws, but those laws are not general; they have so many exceptions that at present it is impossible to say how certain of these principles effect their marvelous purpose. Of some agents we know that their action is entirely reflex, and that the nervous system is affected through certain definite organs. But there are others of which this seems not to be true, and the scientific world is now engaged in the effort to solve this mysterious problem. So far, comparatively little progress has been made, and since the day of Claude Bernard, who advanced the theory that such agents as directly affect the nervous functions do it by a coagulation more or less complete of the protoplasmic ele-

ments of nerve tissue, nothing but barren hypothesis has been advanced.

Of the various impressions which medicinal agents may exert upon nervous function, let us confine ourselves to that state called anæsthesia, as the most important to the practitioner of dentistry, only considering stimulants and sedatives as they may be incidentally connected with our subject.

Narcosis or anæsthesia may be considered as a state of paralyzation of the sensory nerves, with insensibility or complete stupor. It is the suspension of sensation, and is the effect wrought by a number of agents, the most complete and powerful of which is hydrocyanic acid. But there are certain inciting agents or conditions aside from the direct action of drugs. In warm-blooded animals anæsthesia or insensibility to external impressions is produced by cold, or the lowering of the bodily heat, and in cold-blooded animals by the raising of the temperature. We are all familiar with the effect produced upon our own members by a long exposure to a low temperature, and we are conversant with the dreaded drowsiness which benumbs the faculties of a freezing person, which renders him insensible to pain and prompts him only to lie down and sleep. The same effects are produced upon a cold-blooded animal if the temperature be unduly raised.

Experiment 1.—Place a frog in a vessel containing water of 100° F., and it soon exhibits the same inertia and desire for sleep as the freezing mammal, and in a little time becomes quite insensible. If it be now removed to cold water it speedily recovers; but if long continued in the warmer fluid it dies.

The most common agents used to produce an artificial anæsthesia are nitrous oxide gas, chloroform, sulphuric ether, and bromide of ethyl. But carbonic acid, carbonic oxide, coal gas, olefiant gas, fumes of lycopodium giganteum, aldehyde, acetone, and other gases, when inhaled, may produce a like insensibility to external impressions. As, however, they are not commonly used to induce anæsthesia, we will not now particularly consider their properties.

How do these agents produce their characteristic effects? As I have said, this is a question which has not, so far, been satisfactorily answered. But, though no one can give an undisputed demonstration of their manner of action, there are certain phenomena the consideration of which may assist us in coming to some conclusion upon the subject, and these we will examine.

Claude Bernard says that an anæsthetic is a drug which produces a direct impression on nerve tissue. Prof. Anstie says that the pecu-

liar effects are through a modified blood-supply, or by alteration of nutrition, and most modern physiologists agree with him. Which is right? It is certain that anæsthetics are amenable to that law which is universal in therapeutics,—that to produce its characteristic effect a drug must be first introduced into the system, and that the method of its diffusion is through the blood.

Experiment 2.—Expose the lumbar nerves of a frog by raising the point of the sacrum. Pass a ligature around the whole body, excluding these nerves, and then inject the posterior extremities with woorari, or strychnia, or chloroform, and it will be seen that the anterior extremities are not paralyzed or convulsed, showing that the influence is not extended through the nerves.

To produce anæsthesia it is also quite true that there must be sufficient of the agent existing in the blood at one time. Ether and chloroform are eliminated almost entirely by the pulmonary mucous membrane. If of either a much more than sufficient quantity to produce anæsthesia be slowly injected directly into an artery, the characteristic effect is not seen.

Experiment 3.—Into the peritoneal cavity of a cat was very slowly injected ʒii of Squibb's chloroform, and the animal was but little affected. At another time I quickly injected ʒi of the same, and complete narcosis ensued.

When the drug is administered slowly the immunity is due to the fact that it is eliminated before it has time to exhibit its characteristic effect. Not enough is existent in the blood at one time to induce narcosis.

The most characteristic effects of common anæsthetics are produced when their vapor is inhaled, because it is thereby most readily introduced into the blood. The immense surface (about 1400 square feet) presented in the lungs of man brings the blood in osmotic contact with so much of the vapor that the pulmonary circulation is completely charged with it, and this is carried immediately to the heart, and thus distributed to the remotest part of the system without an opportunity being given for its elimination. But if an anæsthetic agent be injected into the venous circulation, little effect is produced, because it is carried directly to the heart, and from thence through the pulmonary artery to the lungs, where it is at once eliminated, never reaching the arterioles at all.

Experiment 4.—Into the jugular vein of a cat, previously anæsthetized, inject ʒi of sulphuric ether, and the animal will soon recover from the narcosis; while if it be injected into the carotid artery, it will deepen the influence.

We may then consider it demonstrated that the drug must be existent in the *arterial* blood in sufficient quantity at one time, in order

to produce its characteristic effect. Now follows the important question: Is it simply held in solution in the serum of the blood, or is it conveyed by the corpuscles? If the answer be, in the serum, that solves the problem at once; anæsthetics manifestly are agents which produce a profound impression directly upon nervous tissue.

But microscopic and other examinations show that anæsthetics change the character of the blood-corpuscles. You are doubtless all of you aware of the effect of carbonic acid upon the blood. It makes bright arterial blood dark in color. Carbonic oxide has a directly contrary influence, and changes venous blood to a bright red. If ether be mixed with blood, it gives it a dark-purple color. It prevents its re-arterialization, and, more than this, it changes the character of the blood-corpuscle. It dissolves it, and sets free the hematine. This phenomenon is less plainly seen in blood during its circulation, but it may be discerned even there. Chloroform turns the blood a brilliant scarlet.

Experiment 5.—Add the vapor of chloroform, or ether, or carbonic acid, or carbonic oxide, to a bottle partially filled with fresh venous or arterial blood, and then agitate it, when the change in color becomes apparent. To demonstrate the fact that ether or chloroform dissolves the blood-corpuscles, place a drop of blood upon a microscope slide, add to it a few drops of the fluid and place under a half-inch objective. Ether effects a solution much more readily than does chloroform.

We see, then, that CO and CO_2 are the direct antitheses of each other in changing the color of the blood. But this difference is not more marked than is that between sulphuric ether and chloroform. Alcohol causes blood to assume a brick-red color, and air will not again arterialize it. Yet the arterialization of blood is not a physiological process, but is quite mechanical.

Experiment 6.—Procure a quantity of defibrinated blood, anæsthetize a dog, and open the thorax. Bleed him to death by opening the carotid arteries, or by severing the aorta. Quickly dissect out and sever the pulmonary vein and artery, and, charging a large syringe with the defibrinated blood, inject it into the artery until it exudes from the vein, to clear the lungs of coagulum. Remove the lungs, with a part of the trachea, into which insert the nozzle of a bellows. Charge the syringe with the defibrinated blood again, and force it through the lungs, when the stream will not be changed in color. Repeat this, directing an assistant to keep the lungs filled with air by means of the bellows, and it will be seen that the blood is now arterialized, or changed to a bright red, the same as during life. But if instead of forcing air into the lungs nitrous oxide or the vapor of ether or chloroform be substituted, definite modifications of the color are produced.

[*Note.*—My observations on this experiment are not as full or complete as I hope to make them during the coming winter.]

It is then demonstrated that anæsthetics have the power to modify the ability of the blood-corpuscle to absorb oxygen. Is it in this manner that we are to account for the physiological effects of these agents? Let us examine some other conditions which in some of their phenomena resemble anæsthesia.

During sleep, as in anæsthesia, there is primarily hyperæmia of the brain, as may be indisputably demonstrated.

Experiment 7.—Anæsthetize a healthy dog, and over one of the hemispheres of the brain make a crucial incision through the scalp. Dissect the flaps back, and trepan, using extreme caution to avoid injury to the dura mater. The flaps are now secured and the animal allowed to recover. After two days, to allow ample time for full restoration, the dura mater is exposed and the animal again anæsthetized. During the earlier phases, and exactly coincident with the chloroform excitement-stage of narcosis, there may be observed a distinct tumor of the dura mater. When anæsthesia is fully established, this is reversed, and a depression exists where had been the protrusion. When this phenomenon has been sufficiently observed, the dura mater should be carefully removed and the wound secured by means of the flaps of the scalp. After another interval the animal should be again anæsthetized, when the brain itself may be studied, and its periods of hyperæmia and anæmia carefully observed.

Asphyxia presents many phases which are not unlike those of anæsthesia, and it is essential that we be enabled to clearly understand the difference between them. It is the result of a deprivation of oxygen, and its effects are mainly manifest upon the medulla. The lungs have nothing to do with the desire of a suffocating animal for breath, nor has the blood, any further than as that affects the medulla.

Experiment 8.—A dog was anæsthetized and a bellows ligated in the trachea, so as to entirely control the supply of air. As long as the lungs were kept expanded by the bellows, it is evident that there would be no attempt at breathing on the part of the animal. An artery was now opened, and the dog bled so nearly to death that the heart almost entirely ceased acting. Notwithstanding the fact that the lungs were kept fully inflated, *the dog now gasped for breath*, because, from the lack of blood-corpuscles to convey it, the medulla was deprived of oxygen. A tube from the carotid artery of another previously anæsthetized dog was now connected with the jugular vein of the animal, and transfusion was accomplished, the regular lung inflations of normal breathing being kept up by the assistant, who worked the bellows in the trachea. When functional activity was fully re-established and sensation of the medulla re-awakened, the thorax was opened and the lungs and heart exposed. The pneumogastric nerve was now divided, the left ventricle of the heart opened, and at the same time the pul-

monary artery ligated to cut off all blood supply to the lungs. It will be seen that the heart and lungs were now both isolated, or paralyzed, yet *the dog gasped for breath.*

As long as the medulla is supplied with oxygenated blood there is no effort or struggle for breath, even though other organs may be deprived of it, but the instant that this nervous centre is left without its needed supply there is a convulsive effort to breathe.

EXPERIMENT 9.—A bitch, two or three months pregnant, was anæsthetized and the uterus opened, exposing the quarter-grown fœtuses to the air. They manifested some uneasiness, but there was no symptom of any independent existence so long as the circulation of the mother was kept up. But when the umbilicus of any fœtus was severed there were shortly afterward convulsive efforts to breathe. This was constant with five of them. The sixth was not separated until after the death of the mother and the stoppage of circulation, when this fœtus also made the same efforts for breath.

In asphyxia the blood is dark in color, and there is the same anæmic condition of the cerebrum as in anæsthesia. The states of asphyxia and of anæsthesia are then analogous in many characteristic appearances, but I shall endeavor to show that there is a wide difference in their pathology; for while one is but the déprivation of oxygen, with the consequent characteristic effects upon the medulla oblongata, the other has added the positive presence of a toxicological agent which induces an added train of symptoms. The one is the cessation of function in the anatomical elements, the other is but a partial suspension in some of them. There are the same or analogous changes in the blood-corpuscles, and yet the pathological condition is widely variant. The one is the complete absence of oxygen from the medulla, the other is the possible partial oxygenation in the tissue elements.

Here, then, are two conditions analogous in their physical manifestations, both either produced by, or attended with changes in the blood-corpuscles, yet the one is entirely inconsistent with continued functional activity, the other quite compatible with life even indefinitely prolonged. This would seem to indicate that the suspension of sensation attendant upon both was due to widely different causes. At the outset of this paper, on the authority of Snow and others, I spoke of carbonic acid as an anæsthetic. This was not a mere inadvertence, but I did not desire to draw a distinction until it became plainly apparent. We now may see that, if I am correct, the two states are not identical. In fact, their nearest resemblance is that

both are conditions of insensibility; but on the same grounds a club may be denominated an anæsthetic, for its vigorous application will induce unconsciousness. We are then ready for a new definition, and an anæsthetic may now be denominated an agent which, existing in the blood in sufficient quantities, will produce insensibility to pain and yet whose presence in such quantities is not incompatible with a continued existence. An asphyxiating agent is one which, while inducing entire unconsciousness, is incompatible with life. Now, as these two conditions are attended by the same physical symptoms, and are yet so widely variant, it would appear that they must be induced by different means. As asphyxia is demonstrably a change in the blood-corpuscle, it would seem that anæsthesia is due to some profound and specific effect produced directly by the agent itself. Herein the conclusions which I have reached are directly opposed to those of Snow, Sansom, Anstie, and most modern physiologists, who believe both asphyxia and anæsthesia to be due to a modified neural nutrition.

Let us look at the matter from another standpoint. I have spoken of the changes wrought in the hue of the blood both in asphyxia and anæsthesia, but it is now time to say that the alterations in color are not due to the appearance of either oxygen, carbonic acid, or any other agent. The changes are *induced* by them, but the diversity in color is merely one of form. Whatever tends to distend the corpuscles darkens the blood, owing to a change in its refractive powers, and the converse of this is also true. Thus carbonic acid distends the disks, carbonic oxide contracts them. Ether distends, and chloroform empties them, and accordingly under the influence of the former the blood becomes darker, while the latter makes it lighter in color. It is thus seen that changes in hue are not necessarily indicative of either the presence or absence of oxygen. It does not seem reasonable that the profound effects of anæsthesia are produced simply by a change in the *form* of the blood-disks. It cannot well be a lack of oxygen, for that is simply asphyxia. We must, then, come to the conclusion that the presence of the anæsthetic agent, as carried by the blood-corpuscle, does produce a profound impression directly upon nerve tissue, paralyzing it for the time, and making it incompetent to perform its proper functions.

This would seem to be the case, too, when we take into consideration the manner of progression of anæsthesia, which is from the extremities toward the central ganglions of the nerves. Anæsthetics also paralyze none but the sensory nerves. In both these character-

istics it is the direct opposite of woorari, which affects only the motor nerves, while its progression is from the centre toward the peripheries. These facts, too, seem inconsistent with the theory that anæsthetics produce their characteristic effects solely by the change in the nutrition of the anatomical elements of nerve tissue. Rather does it appear probable that their action is the invasion of a resistless enemy which, primarily attacking the outposts, where indeed it is first brought in contact with the filamental tissue, in its onward march lays its icy hand successively upon the delicate nerves, and rocks them in oblivion. Just what this power is, or in what peculiar manner it is exerted, we know not. We can study it only in the phenomena which it presents.

There are certain vegetable organisms which exhibit functions analogous to those of the nervous system of the animal world. The so-called sensitive plant presents a kind of embryonic or protoplasmic tissue which performs the physiological office of true nerve structure. *It is as easily anæsthetized as an animal*, and presents analogous phenomena when in an anæsthetic state.

Another reason why it seems to me incredible that anæsthesia is produced through a change in nutrition, is the fact that its agents affect nervous force when ordinary function and blood-circulation have ceased.

EXPERIMENT 10.—Remove the whole upper portion of the head of a frog, including cerebrum and cerebellum; open the thorax, take out the heart and lungs and cut off the extremities, leaving only the upper part of the alimentary canal. Two or three may be prepared in this way, when a smooth glass rod is thrust through each digestive canal, and its ends placed upon steady supports. It will now be found that the remaining portion of the frog will slowly travel along the glass rod, impelled by the vermicular motion of the œsophagus, and intestine, and the ciliary motion of the larynx. But if a bell-glass be put over one of the frogs, and a sponge wet with chloroform be placed within it, this motion either ceases entirely or is materially retarded.

Surely this cannot be from any change in the blood-corpuscles, for their movements have ceased. But there is a persistence of nerve function, especially in cold-blooded animals, which does not cease when other functions are lost, but which, true to its law, is suspended by anæsthesia.

It seems to me unreasonable to suppose that anæsthetics should produce their characteristic effects through an altered nerve nutrition, when we remember how instantaneous is nerve action. Entire loss of sensation may be the result of a simple external nervous impres-

sion, as by fright, or shock; and this not through syncope, though an impression may be wrought through any of the senses which shall entirely suspend sensibility by means of a syncope,—itself merely the effect of a nervous impression. The sight of blood, the hearing of unwelcome news, the touch of a loathsome object, the taste of peculiarly unpleasant substances, or the memories revived through a penetrating odor, may instantaneously deprive a highly-wrought nervous organization of sensation, and induce complete syncope. Shall we say that these impressions are produced by an altered nutrition? It seems much more credible that they are the effect of direct shocks to the terminal nervous filaments themselves.

I now believe that I have produced sufficient testimony to justify me in seriously questioning the correctness of the conclusions of Anstie, Sansom, Snow, Duroy, Lallemand, and others, that anæsthesia is due to an alteration in the blood-corpuscles, or to a changed nutrition.

There are some phenomena presented in the action of the more common anæsthetics which are at least peculiar. While they all affect the sensory nerves alike, or produce the same general phenomena, their reflex effects upon the motor system and upon volition are widely variant. Chloroform and ether produce entire muscular relaxation. Nitrous oxide usually does so, but the administration of most of the other agents produces spasms, either tonic or clonic. At least this has been my own experience. Bromide of ethyl I have known to induce spasmodic action almost like that peculiar to strychnine poisoning.

Why is there almost an entire immunity from danger when chloroform is used in parturition? It would seem as if this agent were expressly intended for such occasions. There are analogous phenomena in alcoholism, as in the immunity from the effects of certain poisons which inebriates possess. These unusual phenomena can only be explained by supposing that nervous tissue is then in such a condition that it is no longer amenable to the profound direct impressions of the anæsthetic or toxicological agents.

Other reasons might be advanced for the faith that is in me concerning the physiology of anæsthesia, but they would be but a rehearsal of what has been better said by others, and I forbear. It appears to me that in this direction lies a wide field for scientific exploration. The speculations of late physiologists have, so far as I am concerned, but served to befog the whole matter. What the character of nerve force is no man can say. It resembles electricity,

but manifestly it is not that energy. That there is an impetus and flow to the mysterious impulse seems demonstrated, and its velocity has been measured, and found in man to be about two hundred and fifty feet per second, while in frogs it is about eighty. This rate of progression alone proves that it is quite distinct from electricity, even were it not true that there is in the nerves no such thing as a closed circuit, and that the mere injury to a nerve-filament stops the current, although there may be no solution of continuity. Neither can nervous force be accounted for on the hypothesis of chemical action, any more than by the supposition of the ancients that the nerves were hollow tubes through which flowed a nervous fluid. The whole subject is a mystery, even to the actual office of the nerves, for they are not essential to life, unless we except those which preside over involuntary muscular action, and the severing of these is only fatal after considerable time has elapsed.

EXPERIMENT 11.—Anæsthetize a dog and sever both pneumogastric nerves. It will be found that almost immediately the breathing and the heart-pulsations become irregular, at first increasing in frequency, but later becoming much retarded. The animal will exist for some days, and will finally die from other complications than the direct stoppage of the heart through want of nerve impetus.

That irritation of a nerve acts as a stimulus and sends some kind of an impulse along its course, we know; and that certain drugs, acting through other organs, produce a decided effect, either of stimulation or sedation, we also know. That there must exist a functional harmony in the system, so that increased muscular exertion will be at once provocative of an increased blood supply, is an evident fact, and it seems to be the office of the nerves to preserve this balance. When we are able to comprehend the character of this nervous force we shall better understand the therapeutical action of anæsthetics; and it seems to me that this very study of neurosis and neurotics is the paramount physiological and pathological question of the day.

ANÆSTHETICS.

The relative safety of the most commonly employed anæsthetics has been much discussed, and this goodly city of Boston has led the way in the indiscriminate denunciation of one agent as always unsafe, and the commendation of another as comparatively harmless. It must have been a model professional coroner's jury which arrived at this sage conclusion. That we cannot with impunity so far interfere with a normal existence as to suspend some of the most important

functions of life must be apparent to all. But the average student desires to know if there are degrees in the risk to be run, and if so, which offers the least peril. For all practical purposes we may ignore all anæsthetic agents save chloroform, ether, and nitrous oxide gas. A long series of experiments, closely observed for the purpose of obtaining illumination on this point, has failed to show any definite reason why one agent should be always chosen to the exclusion of others. At one time an experiment, repeatedly tried with the same results, pointed to a marked difference in certain physiological effects upon cardiac tissue in the administration of chloroform and ether, and I was fondly of the opinion that we stood upon the verge of a grand discovery. But another series, undertaken to fortify the ground I was about to assume and to make assurance doubly sure, overthrew my inchoate theory and again impressed upon my mind the fact that Truth does not reveal herself hastily to the experimental novice. The record of observations was thrown away, and I commenced back again.

The progression of anæsthesia is gradual. It does not overwhelm the whole nervous system at once, but it conquers by detail, and this seems to be the order of its resistless attack upon the great nervous centres:

First—The cerebral hemispheres.

Second—The spinal cord.

Third—The general ganglionic system.

Fourth—The respiratory ganglia.

Each of the agents exhibits certain characteristic phenomena in its action, yet all follow the same general law. Certain definite quantities of any toxicological agent may be tolerated by the human economy, but that point once reached and passed, the peril commences. Were this point of danger a definitely fixed one, we might know when it was approached and avoid exceeding it, but the line of safety depends greatly upon modifying circumstances. During digestion relatively large quantities of any poison may be ingested with impunity. A freshly-fed dog will endure a quantity of woorari that would be speedily fatal to one which was fasting. In producing narcosis we usually desire to anæsthetize the whole nervous system save that which presides over involuntary motion. The danger consists in going too far, and lest the point of safety be overreached, common prudence bids us proceed with caution. Air impregnated with deleterious gases may be inhaled, provided the proportion be not too great. Carbonic acid gas always exists in the atmosphere,

and unless the proportion exceed two or three per cent. it is harmless. Even as high as five or six per cent. is not specially injurious to the person accustomed to its inhalation, and Berzelius says that a man will live for some time in an atmosphere containing thirty per cent. of carbonic acid. Of carbonic oxide one per cent. is injurious, and can be inhaled for but a short time. Chlorine may be breathed in small quantities with impunity, notwithstanding the well-known acrid qualities of that gas. We see, then, that any gas may be so largely diluted with air as to fail to produce its toxicological effects. But there is a proportion beyond which we cannot go in the inhalation of any gas or vapor which will not support life. Exhaustive experiments have abundantly proved that not more than five per cent. of chloroform or ether can be breathed without extreme danger, and the observations of Lallemand, Perrin, and Duroy have demonstrated that an atmosphere of eight per cent. of chloroform is fatal, while two per cent. can be breathed a long time without inducing the anæsthetic state. That the great danger in the administration of any anæsthetic lies in allowing the patient to breathe an atmosphere too highly charged with the vapor is incontestably proved, and it must be accepted as a fact. I have not the time to enter into a further discussion of this subject, or to adduce the volumes of proof which are at hand, but the truth of the assertion is not disputed among experts in the administration of ether and chloroform. In the usual methods of giving these vapors a patient may easily be made to breathe an atmosphere of ten or even twelve per cent. What is the inference? *These agents should never be employed without the aid of an inhaler which may be implicitly depended upon to properly dilute the vapor.* In the use of nitrous oxide safety lies in withdrawing it before narcosis shall have proceeded too far.

In the use of chloroform, ether, and nitrous oxide there is a certain train of symptoms, each following the other with considerable regularity, but not, in the several agents, with the same degree of intensity. The first stage of anæsthesia is one of hyperæsthesia and excitement. There is an increased flow of blood through an accelerated action of the heart, and a dilatation of the capillaries, with contraction of the iris. This is especially marked in exhibitions of chloroform, and during its administration the excitement or hyperæsthetic stage is sometimes very violent; and it is at this time that the danger is particularly imminent in cases of lesions of the heart. Under the stimulus of the great sympathetic, if the muscular tissue

of the heart be weakened by fatty degeneration, or if there be marked diminution of its left ventricular capacity, its spasmodic struggles may result in an embolism when, as is usually the case, the muscular coats of the arteries are weakened through the irregular action of the heart, or that organ may itself become paralyzed through its extraordinary efforts to respond to the exertion demanded. Death then occurs either through spasm of the heart, or paralysis of the sympathetic nerve. The most reliable statistics show that more deaths occur at this stage of chloroformism than at any other, and I never heard of such an unfortunate termination in which the agent was not pushed beyond the bounds of prudence in allowing an atmosphere too heavily charged with the vapor.

Another symptom attending this stage, or immediately preceding it, is the choking sensation, or feeling of suffocation, attended frequently with violent coughing and spasmodic struggles for air,—another indication that the vapor is not sufficiently diluted. These symptoms may arise from two causes. I have in the first part of this paper shown that chloroform and ether modify the ability of the blood-corpuscle to absorb oxygen, and if the atmosphere be too highly charged with the vapor of either, the medulla soon manifests its imperative needs by spasmodic struggles for breath and by symptoms of asphyxia. The coughing arises from irritation of the terminal filaments of the glosso-pharyngeal nerve, as is proved by the loss of taste, and by the fact that if tracheotomy be performed and the vapor introduced through the tracheal tube, no such symptoms are ever observed. Any of you who have experimented with animals when the nozzle of a bellows was introduced into the trachea for the purpose of artificial respiration, and have anæsthetized the animal by means of a sponge applied to the valve, must have noticed this.

The next physiological sign in narcosis is contraction of the arteries, due to a still more profound impression upon the vaso-motor system, and the beginning of the loss of sensation in the extremities, as indicated by a tingling feeling in the fingers and toes, which gradually extends toward the vital organs.

If the excitement stage be once safely passed, chloroform narcosis proceeds quietly until the sensory nerves of the cerebro-spinal system are quite paralyzed, and if it be not pushed too far, the danger is very remote. If chloroform be properly administered and closely watched, it is not as dangerous as has often been represented; but its exhibition *absolutely demands* the services of a skilled expert, for as it is more powerful than any of the other agents, it requires greater care

on the part of the administrator. Especially should the iris of the eye be closely watched, for though in its later stages the pupil is expanded, caution must be observed that the total relaxation of coma be not approached. The danger is chiefly during the excitement stage, and then it is usually the result of want of prudence in allowing too great a proportion of the vapor.

In ether narcosis the excitement period is seldom attended with such violence as with chloroform, and hence there is less danger at this time, for the instances in which ether has proved fatal through paralysis of the heart are very rare indeed, if they exist at all. In all cases of death from ether of which I have any knowledge, the heart has pulsated some time after the cessation of breathing, but with chloroform it is the reverse. Ether, like chloroform, first stimulates the heart, but it does not seriously depress it afterward. The great danger in the administration of this anæsthetic is from the arrest of respiration, and this is due either to a paralysis of the sympathetic, or more often to the filling-up of the smaller bronchi by mucus, through the destruction of the sensibility of the membrane lining them, and the consequent cessation of the ciliary motion of the villi, which carries the mucus forward until expectoration can remove it. In nearly all cases of death from ether it will be found that bronchial râles and stertorous breathing precede death, the latter symptom being due to paralysis of the pharynx. By the expert the unfavorable symptoms from chloroform may be earlier and more surely detected than can those from ether.

The progress of narcosis, according to Anstie, is in its effects manifested—

First—Upon the cerebral hemispheres.

Second—Upon the cerebellum.

Third—Upon the medulla oblongata.

And the narcotized individual will lose—

First—Local sensibility in the extremities.

Second—The intellectual powers.

Third—The general power of co-ordination.

Fourth—Power of receiving sensory impressions.

Fifth—Power of breathing.

Sixth—Involuntary muscular action.

There seems to be, also, a general progress of anæsthesia through the cerebral nerves from the anterior portion of the brain posteriorly, for the first sense which is lost is that of smell, as is demonstrated by the usual demand for more of the agent, and this demonstrates a par-

tial paralysis of the first pair of nerves. This phenomenon is readily accounted for by the fact that the anæsthetic reaches the terminal filaments of the olfactory nerves before it is presented to those of any other, and is an additional argument in favor of the theory that anæsthetic effects are produced by a direct impression upon nerve filaments. After the loss of smell comes loss of sight, loss of ability to control some of the muscles of the eye, and an enlargement of the pupil, owing to paralysis of the ciliary and recti muscles, which indicates the overcoming of the third, fourth, and sixth pairs of nerves. About this time follows loss of sensation in the integument of the face and eyelids, of the muscles of the tongue and of the teeth, indicating paresis of the fifth. This is followed by loss of the expression of the face, and of hearing, denoting a paralysis of communicating nerves of the seventh and of the eighth, while the tenth, eleventh, and twelfth pairs of cranial nerves are the last to succumb.

Of nitrous oxide and the bromide of ethyl, time forbids me to speak extendedly. The first, the especial refuge of quacks, is of use only in brief operations, like the extraction of single teeth and the opening of abscesses. With the last my own experience has been anything but pleasing. In its administration to the lower animals, clonic spasms, sometimes of a very violent character, have induced too great a distrust of its safety to warrant me in giving it to human beings. There are many other things of which I would be glad to speak, and many experiments and vivisections which I have made, especially some illustrating modifications in the circulation of the blood, which I would desire to relate, but I spare you the recital.

My own experiments and observations in the use of chloroform and ether would lead me to use especial caution, in case of the former, to see that there had been no indication of weakened heart's action, as exhibited by fainting and dyspnœa; to use especial caution with those addicted to the use of alcohol, and to be particularly careful to give thorough dilution of the vapor until the excitement stage be passed. Finally, to carefully watch the later stages of anæsthesia, and to suspend the administration at the first indication of any excessive dilatation of the pupil, of stertorous breathing, or of relaxation of the muscles of mastication, as these are governed by nerves which arise from the medulla, and indicate danger to the sympathetic system.

In ether narcosis, instead of watching so carefully the action of the heart and the pulse, I pay particular attention to the respiration, and at the very first appearance of bronchial râles I suspend the administration. In case of the persistence of unpleasant symptoms from chlo-

roform, the utmost exertion should be put forth to stimulate the heart to action, such as the administration of arterial stimulants, electric currents, and nerve shocks. If the danger occurs in ether narcosis, pay little attention to the heart or pulse, but commence artificial respiration, and persist in it until long after hope shall have almost fled. Several instances are on record where artificial respiration, after the methods recommended by Marshall Hall or Dr. Silvester, has resulted in recovery long after the patient had been pronounced irrecoverably dead. In both cases keep up the temperature by artificial heat. Many a life has been lost which might have been saved only for allowing the temperature to be reduced by the subsidence of functional activity. In any case, a cool head and the possession of all your faculties, with perseverance in the use of restorative measures, will enable you to overcome the most determinedly adverse symptoms, and prove you worthy to be trusted in the gravest complications.

DISCUSSION.

Dr. Werner: I like the tone of Dr. Barrett's paper very much. It gives many experiments that demonstrate to me the incorrectness of views formerly held and, to other minds, well settled. In regard to blood that has been oxygenated by passing it through lungs that have been taken from an animal, an important point to be considered is whether the tissue of those lungs was molecularly dead, or was still alive, and could perform for a brief period its functions as if actually in the body. I should judge that in one experiment the latter was the case, and that oxygenation of the blood could be carried on after molecular death of the lungs was not proven. If the lungs have been removed some hours, and have been kept warm and moist, the molecular vitality would not necessarily be destroyed.

It has been settled, I think, generally, that a being when born into this world does not breathe because he is exposed to the air, but because he is in want of oxygen, and if that want is artificially supplied he will not breathe.

If you pump oxygen through the umbilicus, he will not use his lungs so long as you continue to supply him sufficiently with oxygen through that channel.

In regard to pressure upon the medulla, in which are situated those important nerve-centres that control the heart, the lungs, and the vascular system generally, it must be borne in mind that pressing

upon the medulla may stimulate to such an extent that one can trace a decided change in the vaso-motor systems, and such a change may, for the time being, stop symptoms of asphyxiation. This has been accomplished. But simply pressing upon the medulla would not effectually stop an asphyxiated condition. It would only stir up a counter-irritation for the time being. One point was made on nitrous oxide. I do not think it is generally considered that nitrous oxide oxygenizes the blood. The fact is it deoxygenizes the blood, for the oxygen is in such a condition that it cannot be utilized. Narcotism does not begin until asphyxiation has been carried to such a point as to sufficiently anæsthetize a person for a short surgical operation. Few of the operations performed by dentists require the patient to be narcotized, for when narcotism is produced with nitrous oxide it becomes very dangerous, because it affects the inhibitory centres that control the heart. Excessive dilatations of the heart and the general vascular system may result in rupture of the heart, or rupture of the different vessels, principally those of the brain.

Respiration depends not upon any pressure brought on any part of the body, but entirely—and I think this is very well settled—upon the want of oxygen. When that want of oxygen is supplied, by the umbilicus, or otherwise, it is sufficient.

One point was stated in the paper which I like very much, and that is that under the effects of chloroform people die from nervous shock, and not from suffocation. People die from extraction of teeth because the fifth pair of nerves are closely connected with the pneumogastric nerve, which supplies the heart, and shock to the latter nerve results in instant death.

Dr. Atkinson: This is too voluminous a paper to answer in the off-hand speech permitted me, for several reasons: from the inarticulateness with which some of the basal statements were pronounced, and from the inability of anything but the illuminated consciousness to gather such immense tropes of reaches for principle as are contained in the paper. My objection is to coming to conclusions that won't conclude,—simple assertions of an ability to comprehend things adversely by a novice,—to the operations and conclusions and opinions of men who have spent their lives with greater facilities than it is fair to conclude were had on this occasion. As to the truthfulness of the observations, I accept them profoundly.

I have not the first lingering doubt but that the purpose is just what it should be, and I want to congratulate this body that it has lived to see the day when such a paper can be presented and listened

to with the attention that this one has received. But there are several statements in it that I will only say generally I disagree with; some of them for the want of conclusiveness, others for the want of verity. Take, for instance, the statement that CO_2 has any action upon arterial blood. It is distinctly stated in the paper that if you will mix CO_2, commonly known as carbonic acid gas, with arterial blood, it becomes venous. Any man that will show me that is entitled to a Delmonico dinner.

Dr. Barrett: I will have the dinner.

Dr. Atkinson: Another statement was made that is new to me,—that it was generally understood that nitrous oxide supported respiration, or, in other words, "oxygenated blood;" I think the latter was the term that was used. Now, without denying or asserting that, I will state a palpable truth: That if the oxygen that has already found means of engaging one of its bonds of affinity with nitrogen is circulating in a blood territory where there is venous blood, there must be a decomposition of the NO before there can any awakening occur of the normal bonds of affinity in the oxygen, so that it shall become capable of oxygenating the blood. At least, it must have the bond holding the nitrogen severed before the oxygen can be free to be even carried by a blood-corpuscle.

There is some ambiguity in the paper and apparently in the apprehension of the mind in the investigations as to what constitutes circulation, and if you will go back to the books, then the paper is justified; but I take it that where men attempt experiments that had engaged histologists and naturalists for a long time, they should be careful how they operate, and see that they do comprehend what is going on, so as to get a correct interpretation of the results that seem to follow their manipulations. Huxley, in his "Physiology," says that carbonic acid gas is a "negative poison." That is positive nonsense. What is a negative poison? A negative activity. Whether that was purposely said by Huxley or not, such has been his superior shrewdness and competency that men have followed him even in his errors. My friend, Dr. Werner, makes also this statement that he considers uncontradicted, that it is the lack of oxygen alone that constitutes asphyxia.

Now, I have a word to say as a fellow-seeker for truth as to what does occur in respiration, and to assert it, not dogmatically, but suggest it as my prevision, that the essential element of respiration and necessary nutrient activity has never been taken into account by physicists. I base this opinion upon well-observed and well-estab-

lished facts. The lungs will receive one hundred per cent. of oxygen diluted with nitrogen and only appropriate four per cent., and in the air exhaled from the lungs there will be ninety-six per cent. of the oxygen that was within the grasp of the lungs. The bonds of affinity in that oxygen have been so set to sleep by reason of their having been in the lungs that it is unfit for respiration. Does that lead your minds to the apprehension that there is something finer than any molecular body in atomic presence that is the cause of the support of vitality in any organism that respires? Until we shall have gone to the bottom, all that these experiments are worth is simply an accumulation of facts under which the world is to-day groaning, without the ability to interpret to the satisfaction of a clear-cut perception that has in it any morality, any love of truth.

We all love the truth for ourselves. Do we take as good care that only sound statements shall pass the portals of our lips, that are the divine trysting-places of the intelligences of the spheres, that we may interpret the careers of the bodies with which we meet, the origins and causes of which as yet we know nothing in a scientific way, save through inspiration—clear and clean revelation of truth to the consciousness of the individual!

If we are talking of circulation, we have, involved, all that I have suggestively stated, that we must recognize a fountain from which whatever circulates takes its start on a circuit through which it goes and a destiny to which it returns. If we are confined to the heart, we shall not have an explanation. Bichat long ago said the tripod of life is "innervation, circulation, respiration." What are the currents that we have to deal with in asphyxia? This special subject was nominated anæsthesia,—privation of feeling, that was all.

What have we in circulation? Does the blood circulate by reason of energy in the blood column? By no means. The vaso motor system was spoken of by one speaker, and that it had a dual root in the medulla. Why the dual root? What circulates in the vaso-motor and in the sensory lines of the nerve tracts? It is this same thing that in the heart they call "Accasa."

Let us see that we have a triple manifestation of energy in every circulation, and that when we arrest any one of the three legs of the stool, it topples over, so that if you stop respiration you have innervation and circulation arrested, and what is called death ensues.

Dr. Shumway: I think the thanks of this body are due to the gentleman from Buffalo for the paper that he has presented here, and the practical suggestions which that paper contains. My own experience

and observation wholly conform to what the writer has said, in so far as practical results are concerned. He has carried experiments so far as to justify him in making statements here which none of us would be justified in making. I have felt for a long time that this subject had not been so thoroughly digested and put before the dental profession as it should be. I feel that whenever I have made use of an anæsthetic, I have taken the life of my patient in my hands, and that there was a degree of responsibility resting upon me that demanded that I should bring to bear the greatest amount of intelligence, in order that I might do the best possible thing, and I think that this paper is the most timely and suggestive one that has been presented with which I am acquainted.

Dr. Barrett: What little I may have acquired of manual dexterity in the performance of physiological experiments I owe to Prof. W. H. Mason, of Norwich, Conn., the Gamaliel at whose feet it has been my privilege to sit; one of the most enthusiastic of teachers, and a manipulator whose skill is unsurpassed. It is but proper and just that I should render this public acknowledgment of my indebtedness to him, for many of the experiments upon which I have relied for conclusions are original with him, and I have drawn my deductions indifferently from his or my own vivisections.

I stated to you at the outset of my paper that what I had to say was advanced with great diffidence, because I knew that the conclusions which I had reached were in direct conflict with those of the chief authorities. I do not presume to set up my opinion in opposition to that of these eminent men, neither am I willing to accept these or any other person's views unquestioned on matters which I may investigate for myself, be the subject professional, secular, or religious.

When I perform an experimental operation, and it seems to demonstrate to me a certain truth, it matters little what eminent authorities hold opposite views. I perhaps endeavor to use extra precautions to eliminate any possible source of error, but I stand by my own judgment. When people of other opinions demonstrate to me my error, I shall be glad to acknowledge it. If any gentleman now present will point out to me any false reasoning or deduction from fictitious premises, I will heartily thank him, for it is TRUTH, and not a polemical victory, that I seek. No one need desire to spare my personal feelings or pride of opinion, for if such a thing is resident in me, it is time it was eliminated. I have audaciously called in question the opinions of men to whose knowledge I cannot pretend

to aspire, and it would come with poor grace from me to refuse to another, my equal, what I claim from my superiors. But I do object to wholesale denunciation. I do protest against such indiscriminating assaults as have been made upon a paper read here yesterday, especially when the author is not present to defend it.

PRESIDENT: The gentleman is not talking to the question; he is talking personalities.

Dr. BARRETT: I do not intend to talk personalities, and utterly disclaim any such meaning. But I do protest against any indecency of language in either commending or denouncing a paper. Every gentleman has a right to an entire courtesy, and his views are not to be ridiculed or denounced except they be first disproved. Let us show what is bad, let us test what is good, and if error be detected let us demonstrate wherein it lies.

There have been one or two new views expressed which I wish to notice, and one or two misunderstandings which I wish to correct. It has been stated that I claimed that nitrous oxide oxygenated the blood.

Dr. ATKINSON: I did not say so. Let me restate what I said: that he said that that was the prevailing opinion among dentists.

Dr. BARRETT: And I will stand by that opinion every time. There was another point. The gentleman states positively that CO_2 will not darken blood-corpuscles. I as positively affirm that it will.

Dr. ATKINSON: I did not state it would not. I offered a Delmonico dinner to any man who would prove it would.

Dr. BARRETT: Many a time have I taken bright oxygenated blood and have shaken it in a jar with carbonic acid gas, and always, invariably, was the color changed. Surely, there must be more than one present who has either tried this experiment or seen it tried.

Dr. WERNER: It will change it.

Dr. BARRETT: Is there any other witness to the truth of my assertion? Yes, there is another. We *know* it will change it.

A MEMBER: Was the air exhausted from the bottle before the blood was introduced?

Dr. BARRETT: That is not a part of the experiment. Were the air to be exhausted by means of a pump, or by any other such artificial method, all the environing condition would be altered at once, and the whole experiment vitiated. Such a method would remove all the free oxygen, and so alter the state of the blood that it would be not at all analogous to its natural condition. Besides, the carbonic acid will quickly enough remove all air in the jar not held in the blood.

It is so much heavier that it displaces the air as effectually as would water. I am astonished that the gentleman does not comprehend that fact. Any one competent to call in question so obvious an experiment should be fully aware of this. But the test is an easy one. Go home, gentlemen, and try it for yourselves, and then you will know positively, and not need to rely upon guess-work.

Dr. Brophy: The question has arisen as to whether nitrous oxide oxidizes blood, and the gentleman has stated that he believes the opinion that it does is accepted by the greater portion of the profession.

Dr. Barrett: I do not allude to members of the American Dental Association. I refer to the profession at large, country as well as city. All of us are aware that nitrous oxide is advertised throughout the land by the Cheap Johns as Vitalized Air, and the greater part of the profession, so called, to-day believe it air enriched with oxygen, and differing from atmospheric air in nothing else. What does the average dentist know of chemical combinations? How long would it take you to make him understand the difference between the mechanical mixture of O and N, which constitutes the air we breathe, and the NO of protoxide of nitrogen? They verily believe that it at least ought to furnish all the conditions for supporting life.

Just what the physiological action of nitrous oxide is upon the blood I am not now prepared to state, but I hope another year to be able to demonstrate it to you.

Dr. Brophy: I believe the gentleman is mistaken. Among the more intelligent members of the profession I think this matter is better understood. There are a great many intelligent men in the profession who, I regret to say, are not members of this Association.

The question naturally arises, What does nitrous oxide do when inhaled as an anæsthetic? How does it prevent oxidation of the blood? I consider that it does for this reason.

Nitrous oxide gas is a combination chemically of nitrogen and oxygen, in the proportion of two of nitrogen and one of oxygen, N_2O; therefore we have a chemical union. Atmospheric air, as we all know, is a mixture of gases,—nitrogen and oxygen; therefore, when nitrous oxide gas is inhaled, the bonds of union, although not exceedingly strong, are sufficiently so to prevent the blood from receiving oxygen, therefore carbon dioxide accumulates within the blood. These are the views I have held in regard to this matter for some time. I have met with gentlemen who have opposed them, but I have yet to see it proved that it is not true.

Dr. Wilson: I am from the country myself, and I think I can speak with some experience on this point. I think that the general run of the profession know nothing about the composition of air, and they do not know the difference between a chemical compound and a mechanical mixture; and I think I can safely say there are a great many who cannot understand the difference between the two without more and better information than they at present possess, and they no doubt regard vitalized air as about the same thing as our common atmosphere, and for that reason I think Dr. Barrett's statement is correct.

Dr. Barrett: I suppose that no gentleman now present will understand me as having made the assertion that protoxide of nitrogen oxygenated the blood, or that I was of the opinion that the intelligent portion of the profession entertained such a belief. But I am of the opinion that, numerically, the greater proportion of dentists believe that nitrous oxide is a gas which will sustain life. They do not reason it out to that point, but they have a kind of foggy idea that it will purify the blood, and that it can be breathed like common air.

Dr. Buckingham: I agree with what my friend on the left has said, that we do not know anything about it. If we depended upon oxygenation of the blood for producing anæsthesia, oxygen would be the best agent, but it does not produce the anæsthetic effect. That proves that free oxygen is not the active agent in these cases. Because there is oxygen and nitrogen combined together there, it is no reason to suppose that the combination may be decomposed when it comes into the circulation of the blood. It acts in some way we do not understand. Chloroform, ether, and nitrous oxide all produce the same effect.

The chemical composition you all know is different. Chloroform will not burn, ether is highly combustible, and nitrous oxide is the supporter of combustion. A celebrated experimenter undertook to show that he could demonstrate the effect of an anæsthetic by putting a light under a vessel and letting it burn out the oxygen, depriving it of oxygen and produce asphyxia. That was his idea,—merely to deprive the lungs of the oxygen, and produce the anæsthetic effect in this way. We do not know how it acts: it acts in some way by paralyzing the cell. It is probably, as Dr. Barrett has said, carried through the circulation. It comes in contact with the living functions of the body,—not the man himself, but the individual cells,—and it produces a paralysis of these cells in some way that we do not understand.

There is no man who will undertake to tell us how the action takes place in the cell itself, or how the cell grows up.

We can trace the circulation of the blood, we can trace it through the capillaries, we can suppose it goes around to the whole circulation, but it is not there that it produces nutrient or physiological effects, it is in the cells themselves; it must pass out of the current.

There has been a very fallacious idea in regard to that, that you must have capillary vessels carry the blood through the parts in order to have nutrient air.

It is on the outside where it produces the effect, and when it goes through the cell itself, and goes into the working body of that cell, it produces that effect. There is the life-course, and whenever you paralyze that in any way you paralyze the whole.

Dr. Werner: I wish to ask Dr. Barrett if he believes that blood is mechanically oxygenated.

Dr. Barrett: Most certainly, so far as the presentation of air to the blood is concerned,—that is, it is not necessarily a *vital* process. Remove a dog's lungs from the body, having first forced through them a quantity of defibrinated blood to clear them of obstructing coagulum. Now, into the pulmonary artery, by means of a large syringe, force a quantity of defibrinated blood, at the same time keeping the parenchyma expanded by means of bellows in the trachea, and the blood which exudes from the pulmonary vein will be distinctly oxygenated. This experiment I have repeatedly tried, and it clearly proves that vital currents and movements have nothing to do with oxygenation of the blood.

Dr. Werner: When oxygen is taken up through lungs that have been extirpated, why should it not oxygenate the corpuscles when the lungs are not extirpated and are still in the body? Or if it is simply a mechanical process, why does it not oxygenize the blood when nitrous oxide is inhaled? From the fact, I think, that the elements are eliminated from the lungs, and that it requires a getting-rid of certain things before a taking-up of others—oxygen—can be accomplished. No man has been able to thoroughly analyze the exhalations from the lungs of a being to whom nitrous oxide has been administered, and with some authorities it is a question whether persons ever take absolutely pure nitrous oxide. This gas is such a difficult thing to keep that it is hardly possible to administer the pure article except the animal be submerged in the gas, and not *forced* to inhale it. We know that the inhalers are so imperfect that, when Dr. Barrett

administers forty gallons to a dog, he likely administers twenty of air and twenty of nitrous oxide, and that is why the animal is not asphyxiated or narcotized.

If he were to administer pure nitrous oxide, the animal could not inhale more than six or seven times before it would be partially asphyxiated, and directly after that would become narcotized, too.

The Unwritten Law of Dental Ethics.

Volunteer Essay by C. A. MARVIN.

ALMOST every dental society has its code of ethics,—more or less elaborate, more or less stringent. It is incorporated in the printed by-laws, and provision is made in the same laws for the prosecution and punishment of any and all who are charged with the infraction of said code and are found guilty.

As the code of ethics which governs any society has been adopted by the same vote as that by which the other laws were enacted, it follows that as the general by-laws are the formulated views of the members as to government and procedure when in convention assembled, so the code of ethics must be taken as the formulated expression of the same membership as to what constitutes consistent, honorable, professional conduct. Ethics is a system of morals, and, strange as it may appear, it is deemed important, nay, necessary, to put into words—actual words—the rules which should govern honorable gentlemen in their intercourse with each other and with the public. It is not considered safe, let it be observed, to leave such intercourse to be governed by the natural instincts of the gentlemen themselves. It is not intended to comment on this necessity, or felt necessity, but merely to state the fact.

Just here a nice question might be propounded, viz., Whether the fixing of certain rigid rules of conduct insures as high-toned and exemplary demeanor as the operation of the principles of honor and integrity when left to work out their own natural result without restraint of law? When a code is made, observance of the letter of the code is all that is required. The principle beneath is hidden. May not the attention be so engrossed by the prescribed rules continually set before us that all thought of that principle beneath is precluded? Indeed, may there not be an absolute disregard of the existence of any principle there whatever?

Leaving the two thoughts just suggested for any gentleman to meditate upon if he so desires, I pass on to the immediate object of this paper, which is to call attention to the ethical principle which should govern professional action at all times, and to the ease in

which it *may be* (shall I say it *is?*) violated without coming in conflict with the written code and incurring its penalties.

The fundamental principle of our code of ethics is, a courteous regard, on the part of every dentist, for the rights, the feelings, the reputation, and the interests of every other dentist; also for the dignity of the profession itself. Anything that is in any wise adverse to this principle is an infraction of ethics, whether the code specifies the particular act or not.

It is deemed unprofessional, for instance, to advertise one's self, and it is so stated in the written law; but may not expedients almost numberless be resorted to to accomplish this very end? I mean other than the proper participation in public discussion of professional questions or writing for journals. These are appropriate, are expected, are incumbent upon practitioners.

Now, it is not held in this paper that it is improper in a professional man to make himself known in the community. It is right. It is his duty. He owes it to himself and his family. But there is a proper way to do it. It is more becomingly done by letting his light shine out, as light streams forth from the windows of a brilliantly-illuminated house, than to make a forced parade of it. People understand quite as quickly that there is a light within the house as they would were a bonfire built in front of it and a bell rung to call them to look at it. So the ability that will not stay imprisoned within a man, but displays itself by reason of its own diffusive nature, must command attention and win favor more hearty, more enduring, than when egotistically paraded by the owner. Indeed, its genuineness in the latter case is often doubted, and with reason. It is not necessary, for instance, that special attention should be invited to the particular degree one is entitled to affix to his name, nor that a comparison be instituted between it and that which has been conferred upon some other man. The degrees are not affected by such boastful talk, but the speaker is, and, in the minds of sensible persons, not at all in the direction he intended. Such violations of the spirit of ethics are not entirely unknown.

Again, when in speaking of certain departments of dental practice which the speaker pursues, allusion is made to some other practitioner who omits some one of these in his practice, and the omission is held up as an evidence of lack of attainment or proficiency, a violation of the spirit of ethics is committed. One's own kind of practice can be made matter of conversation properly, and one's ideas as to the comparative value of departments may be expressed with propriety, and

one's views as to general or special practice may be given freely, and no offence against propriety be committed. The offence consists in the disparaging comparison of another with one's self; in so shaping the conversation that self shall be exalted, and not only so, but exalted *at the expense of that other.* This is unethical; this is dishonorable. Is it ever done?

The success, however, of such a course is short-lived. The public will learn what dentist is reliable in the department of prevention of decay; of the arrest of decay; of saving greatly weakened teeth; of restoring to usefulness wrecked teeth; of correcting irregularities; of treating oral diseases; of constructing artificial dentures; and if this information is gained through others and not through the practitioner himself he stands much higher in consequence. In service as important, as publicly known as dental service, the injunction in the old adage becomes inevitably a statement of fact, for "every tub" *will* "stand on its own bottom."

The *spirit* of ethics is very wide-reaching in extent, and capable, if truly appreciated and obeyed, of working a revolution of no insignificant dimensions in dental action.

It has been noticed possibly that in our profession, as in others of a scientific character, there is not an *entire* want of superciliousness on the part of advanced men towards men of less attainment. Neither is there any *excess* of the disposition to encourage young practitioners, timid speakers, earnest but not yet profound thinkers.

On the contrary, has there not been seen a disposition to tower above, and in the confidence which experience has given, to overawe these diffident brethren by loud tones and high-sounding phrases?

If this is so, not only is the spirit of true ethics violated, but an evil is quite likely to ensue of wider extent and more baleful nature than may at first thought be perceived.

If the timid brother's feelings are wounded and his voice silenced, his ethical rights have been infringed and the principle which should govern professional intercourse has been as truly violated as though some written article of the adopted code were broken.

Besides this, there is sustained a loss on the part of the society,—the loss of that brother's *true* views. He will, if inclined or urged to speak, either conform his views to those of his assumed superior to avoid criticism and win his favor; or, if honest enough to hold his own opinions and to decline to accept, on statement, those which clash with them, he will keep his seat and preserve silence. His

mind will not cease its operation, however, so that, like the owl, though silent, he will keep up considerable of a thinking. But *what* he thinks, however useful and interesting it might be, will not be likely to be known. Hence a loss to him and to his society.

The phase of ethics which we are considering has two sides, and to be fair we must look at both. If it is unethical to criticise rudely the diffident brother who is doing the best he can, it is quite as much so for any one, strong or weak, bold or diffident, to occupy time when he has nothing to say, or compel gentlemen to listen while he utters in a hesitating and stumbling manner crude, half-formed opinions which distress but do not edify his hearers. So that, while the leading members of a society should encourage the more retiring to take part in the business of the meetings, these should *prepare* themselves for such participation, that what they do may be for the benefit of some *one* or for the *general* good.

Time is valuable. Time lost can never be regained. Time well spent is time saved. Time so occupied that instruction is gained is time well spent. Time consumed in uttering meaningless words is time wasted.

From these axioms the inference respecting our duty is inevitable. Ethically considered, it is our duty, each one of us, to avoid whatever would cause loss to another. If I waste time which another might use to advantage, I defraud somebody. If I claim the attention of gentlemen while I speak nonsense, or speak wanderingly, or impertinently, or tediously, I defraud many, and as the fundamental principle of all ethics is regard for others' rights, I commit a breach of the great, wide-reaching, unwritten law which is my text to-day.

Perhaps we have not thought as much of this as we ought. It is a truth generally very little considered by men when gathered in convention, to say nothing of other times. It should be considered and should be observed, and its consideration and observance would accomplish good. It would not, as might be hastily concluded, discourage debate, but would make it more pointed and practical. It might reduce the number of words spoken, but would not damage the ideas presented. It would insure the *possession* of ideas by every one who should claim the attention of the assembly.

It would stimulate the habit of rigid thought, and educate a man to refine his ideas in the glowing fires of his mental furnace, that the real substance may be perceived, its dross burned away. Crude ideas are better than no ideas; but when sufficient time has been taken to

mature such ideas, before presenting them for the reception of hearers, it is better still. Crudeness may be amusing at times, but is not gratifying. It is often tolerated from a sentiment of good-nature, or because an immediate response to an unexpected call has afforded no time for maturing one's views, but the manifest expression of distress resting upon the countenances of the audience shows how little they are gratified. And when at such times a speaker insists upon holding the floor, and compels his hearers to be the unwilling spectators of his terrible struggle with a half-delivered thought that rebels against being born, and then repeats the painful exhibition again and again, who is edified? Edified! Who is not the rather rasped to an every-fibre-searching shiver? Who has not felt that the full time had come for some Berghian champion of human comfort to arise and prevent further cruelty?

So that when raw, unformed ideas are received with any degree of favor, it is not that in such immature form they are pleasing, but because of some recognized necessity for that immaturity which calls for the indulgence of the hearers.

But it should be well understood that it is unsafe, as it is truly unethical, to *presume* upon this extension of indulgence, and neglect that study and preparation which would spare the audience a repetition of the infliction they have already suffered. They might not bear it as patiently again, hence it is unsafe; they ought not to be made to suffer it again, hence it is unethical.

The more this subject of ethics is pondered, the more clearly will it be seen to stretch itself along the course of professional action, touching it again and again, until, to the earnest gaze, it shall assume the dignity and majesty of *law*, to which conduct must conform or be faulty, rather than a pretty sentiment hung as an adornment upon the conduct and adapting itself to all its variations. A close scrutiny and a construction no stricter than the principle will easily bear, will reveal to us, in the unwritten law of ethics, an inflexible standard, whose rigid righteousness would expose, to our shame, oftentimes, much irregularity, much variance, were our conduct compared with it.

Not only are our relations with our fellow-practitioners affected by the ethical principle we are considering; our relations to our profession as a noble science, and to the public as the recipients of our service, are concerned as well. There are duties we owe to both; and where—*anywhere*—are duties there ethics has its place.

What is our duty to our profession? I have considered this ques-

tion in a paper written many years ago, and shall therefore answer it very briefly at this time.

In a word, then, the dentist's duty to his profession is to maintain its dignity, to increase its efficiency, to make it honorable in the eyes of men.

Any course of action which will diminish public confidence in dentistry as a profession is a breach of duty, and every breach of duty is an infraction of the principle of ethics. Hence, poor practice, imperfect operations, unskillful treatment, wasting of time, whether resulting from carelessness or ignorance, are unethical.

Hence, extravagant boasts of the advancement which dentistry has made, not sustained by the practice of the boaster; large claims for the sufficiency of dentistry in specific cases of disease, obscure and severe, not followed by the expected success in cases actually under treatment, are unethical.

Hence, surgical operations so clumsily performed that the patient and his friends are not at all persuaded that he has fared better in the hands of the specialist than he would have done in those of the general surgeon (the result being an unfavorable opinion of dental surgery), are *unethical* as well as discreditable.

Hence, undignified deportment and a disregard of the courtesies that are expected to distinguish the professional gentleman, a clownish manner and a slangy speech, a repulsive person or a rough touch, are unethical.

Hence, profuse conversation interlarded with unnecessary scientific terms, which is so superficial that the listener gathers no information and is only puzzled by the terms and wearied by the clatter, is unethical.

Something more may, with propriety, be said in this connection.

It must not be supposed that because our patients are not dentists they are unable to weigh our conversation, or to decide very quickly whether we are talking sense or nonsense, intelligently or at random.

A free use of scientific terms will not pass for well-expressed ideas, nor redound half so much to the credit of the speaker as the simple language which conveys some useful and appreciable thought.

Dentistry is a positive science as well as a practical art, and a practical art as well as a positive science.

Abstruse philosophy, however attractive, has no value to the practitioner whose mission is to achieve palpable results. The power of reasoning is a wonderful attribute of the human mind. But of what use is reasoning except a point is aimed at, and except that

point be a practical one? The work of life is to the last degree material, not ethereal. Signally so is the work of our profession, and the dentist who would be ethically faithful to his calling in the particular of making it honorable in the eyes of men must be mindful of this fact. When he talks, let it be to express an idea. Let him cultivate the faculty of expressing his idea clearly and concisely, and when thus put forth, of letting it alone. When he reasons, let it be from a premise, accepted and demonstrable, by logical proeedure, to a conclusion desirable and in advance of the starting-point. When he advises, let it be seen that he has a reason for his advice clearly defined in his own mind, and that the advice is the inevitable fruit of that reason. When he works, let his effort, whatever it be, be characterized by intelligence, by a clear purpose to attain a clearly perceived end. Such a course will do more to honor the profession in the eyes of men than fine-spun theories, vague philosophies, and sonorous phrases of empty words. Such a course will embody and illustrate the fundamental principle of true ethics.

Am I met by the inquiry, "Shall no search be made, then, in the regions of mystery?" "Shall nothing be said or written but that which is clearly understood?" No such interdiction can be fairly deduced from what has been said. Search? Aye, search most diligently. Penetrate as far into the regions of the unknown as your boldest foot and keenest glance can go. Enter if possible into the barred chambers of occult wisdom and possess yourselves of her choicest arcana. Enter into the inner sanctuary where the richest stores of science are concealed and lay hold of them with firmest hand. But in the exciting quest forget not to discriminate carefully between treasure and tinsel, between the solid and the superficial, between the real and the seeming. And when the search is crowned with success, come forth again, bringing your treasure with you, and lay it on the common altar. To do thus is to honor one's self and to honor the profession in whose interest the labor is undertaken. This is ethics. To do less is to defraud one's self, and by just so much to defraud the profession, and this is an infraction of the great unwritten law which we are considering.

What I am urging is the creation of a goal towards which we shall press. In our personal relations that goal is the cultivation of mutual consideration; in professional work, the highest good of those committed to our care; in professional conversation, the clear expression of positive ideas; in professional life, the maintenance of personal honor; in professional study, the securance of valuable information;

in society relations, the devotion of one's best energies to the promotion of the general good; in the labor of scientific research, the exercise of that calm, persistent, wise discrimination that digs and *tests*, that gathers and *sifts*, so that golden grain and not weightless chaff may be the product.

Such is the privilege, such the duty of every intelligent man, *as a man;* of every faithful dentist, *as a dentist;* and the more steadfastly, the more vigorously, the more religiously he exercises this privilege and performs this duty, the more nearly will his life accord with the requirements and the spirit of the great *Unwritten Law of Dental Ethics.*

SECTION III.

Dental Literature and Nomenclature.

Report by W. H. ATKINSON, Chairman.

IN the report of this committee of last year there were two allusions which will form the connecting-link with this report. The first was to the nature of universology as the one all-inclusive science, from which all our technical notions of classification and nomenclature must hereafter be derived. The other was to language, as a remarkable and guiding instance of a branch of universal things so well understood and so thoroughly distributed (in its grammar, etc.), as to furnish a sort of model for the distribution and classification of all other departments of being.

Let us hold fast to these two guiding ideas, and proceed to lay the basis of classification and nomenclature on their broadest and most fundamental generalizations.

In the report of last year we gave illustrations of minute and particular nomenclature (punctits, punctids, etc.), in order to demonstrate the capacities of the new method in that range of things where, as histologists, we shall have the most occasion to employ it. We pass now to the opposite pole,—that of extreme generalization,—in order to establish a groundwork of method which shall be demonstrably adequate to embrace and sustain the whole system of possible discriminations of this sort, and so to prove that this is not merely *a* system, but *the* system to which we *must resort* if we would have anything which shall be thorough and exhaustive. Do not be afraid of technicalities, and even of novel and difficult technicalities, since to look for the founding of a system of nomenclature of universal application without new technicality would be as absurd as to demand of your cook to make an omelet without the breaking of any eggs.

We must also recall the fact that Alwato (ahl-wah-to) is the name of the new scientific language derived from universology, of which these new technicalities are merely *some of the words.*

Three departments of universal things will now be compared, with reference to their most general distribution of parts: First, the Cosmos, or world at large; second, Language, already alluded to as an epitome of the world, or as a little world distributed on the plan of the big world; and, third, the Human Body, as another little cosmos or world, also distributed upon the same universal principles.

A distinction is made, universologically, between the cosmos (albo) and the universe (alio). The cosmos means *whatever is*,—the aggregate of universal things—in so far as conceived of as an organized or embodied whole, or as an organism, and as capable, therefore, of distribution into parts in a manner like that in which we distribute language, or the human body, or any other organism. The universe is a word of larger but more indefinite meaning, and signifies *whatever is*, absolutely, or the aggregate of universal things, whether *cosmified* or organized, or diffusive and chaotic.

The three objects for present comparison are, then,—

1. Albo (ahl-bo), the Cosmos;
2. Wato (wah-to), Language; and,
3. Hobodo, the Human Body.

[Bodo is body. The prefix ho confines the meaning to the human sphere of things.]

First let us deal with Wato (language). This undergoes the well-known discrimination into (1) Parts (of speech), the basis of grammar; and (2) Elements (of sound), vowels and consonants, the basis of phonetics or phonology. There is here a noteworthy difference between parts and elements; but "parts" is here used, as we shall presently see, in a very extended and unusual sense.

There are usually reckoned (say) nine parts of speech. These can be, however, and are,—for universological purposes,—reduced to three (parts of speech of a more generic order). These are:

1. *Substantivoids* (including substantives, pronouns, and interjections,—the vocative with its compellative sign, etc.);

2. *Adjectivoids* (including adjectives, participles, and the articles); and,

3. *Connectives*, or *Relationoids* (including prepositions, conjunctions, and adverbs, which last are all reducible to a substantive in an oblique case, or to a substantive and preposition,—as, *surely* means *in a sure way*, etc.,—and so all oblique cases of substantives are inversely equal to adverbs).

The verb is in this distribution unprovided for. This is because it is a focalization, or totalization, of all the other parts of speech, or sums

them all up, or includes them all. All other verbs, except the verb *to be*,—the so-called *substantive verb*,—are reducible to this one (*to be*), joined or smelted in with a participle (or motic adjective). The so-called participle is always nothing else than a motic adjective, or adjective of motion (running, reading, etc.); and the so-called verbs runs, reads, etc., mean *is running*, *is reading*, etc., so that the great mass of the so-called verbs (all, indeed, but the single verb *to be*, *is*, *was*, etc.) are virtually adjective in character (except the *is*, *was*, or *were*, etc., which are parts of the verb *to be*).

But the essential part of every verb is this copula (*is*, *was*, *were*, *will be*, *etc.*), IS, or some other part of the verb *to be*; and this is known as the *substantive verb*, because it embodies the idea of *being*, which is also the character of the substantive. The verb is thus, therefore, from another point of view, a substantive (instead of being an adjective). Finally, the verb *to be* (really the only verb) is neither substantive nor adjective, but a peculiar kind of connective (or copula), joining the substantive and adjective in a proposition, as, JOHN IS SICK, and hence it is a *relationoid*, or, a word of relation; so that, from this third point of view, it may be rightly and tersely said that *there is but one verb, and that one is a conjunction.*

The verb is therefore the central rosette, or figure, of language, and is rather a peculiar epitome and *wholeness* of speech than a *part* of speech, like the others, though for convenience it may be reckoned as the tenth part of speech.

Language is the *expression* of the universal reason; the verb is the *totalized individual* of language. Hence the Latin *verb-um* renders the Greek *logos* (meaning both *speech* and *reason*), which is again "the *word*" of St. John, who affirms that "In the beginning was the Word, and the Word was with God; and the Word was God," meaning that the universal reason, expressed through the individual, is one and the same as God.

Passing to Albo (the cosmos, and this is alike true of alio, or the universe), there are three parts of being (in this same large sense of the word parts) which accord with the three grand parts of speech in this way:

1.	2.
ALBO.	WATO.
Three Parts of Being.	Three Parts of Speech (grand).
1. Aggregates (or things).	1. Substantivoids.
2. Properties.	2. Adjectivoids.
3. Relations.	3. Connectives (or relationoids).

In Alwato, these two parallel sets of discriminations appear under the following names, which clearly indicate, in the forms of the words, their inherent parallelism:

1.	2.
ALBOSO WARDZ.	WATOSO WARDZ.
1. Albo,bau,adīts.	1. Wato,bau,adīts.
2. Albo,mlau,adīts.	2. Wato,mlau,adīts.
3. Albo,sayiuts.	3. Wato,sayiuts.

Space does not admit of giving here a full account of the reasons for the particular formation of these words. By throwing off the prefixes by which they are confined, in meaning, to their particular spheres, they are generalized so as to be applicable to either of these and to all other spheres, thus,

1. Bau,a,dīts (bow-ah-deets).
2. Mlau,a,dīts (mlow-ah-deets).
3. Sa,yiuts (sah-yutes).

These, then, denote three very fundamental aspects of being (thing-like, property-like, and relation-like) in their most universal sense, and are root-words, prepared to be assigned by adding the necessary prefixes, which will assign them to whatsoever sphere.

Assigned to the human body (as one of the spheres of being), the prepared terms apply thus: Hobodo,bau,a,dīts signifies all the real objects, of whatsoever character, which go to the make-up of the human body; hobodo,mlau,a,dīts signifies the properties or attributes (qualities, as colors, sounds, smells, shapes, etc.) of the human body; and, hobodo,sa,yiuts signifies the connections or joinings of body with body (within the body), of part with part, of organ with organ, etc., but especially of the *whole* body to its environment, as the connection of *parts* belongs more especially to the category of *articulations*, subsequently to be noticed.

By this allusion to the Whole (in its individual epitome) we are reconducted to the verb, and its analogues in other spheres, of which the human body in its totality (hobodo,al) is one. Language, as *totalized*, is again redistributed, not now into "parts," but into elements; and so with the totality of the human body, etc.

Observe, then, that all the discriminations above treated of (except in this last allusion to wholeness) belong to the *elaborated* aspect of things, and not to the *elementary;* which is perceived readily if we advert to the parts of speech in language as belonging to grammar,

which pertains to the elaborismus (the elaborate domain) of language, and not to the elementismus (the region of *elementary* sounds: vowels and consonants). Let us next consider the elementismus of language, of the human body, and of universal things (albo or alio).

Recall, first, the fact that parts, in the phrase "parts of speech," does not mean parts in any ordinary sense, as fragments, for instance, of real things, but that all real things, collectively (or their substantive names), are, in this sense, only one of the parts of universal being, properties and relations being the other two parts, in the elaboroid or structural view of things. But in the elementary aspect these three discriminations appear in a distinctly new phase.

The lingual elements (or elements of language) are vowels and consonants (or, better, for present purposes, consonants and vowels). These may be classed as follows:

I.	*True Consonants; Hard Sounds; "Solids."*			
	k,	t,	p,	(joint-like.)
	g,	d,	b,	(bone-like.)
II.	1. *Vowels.*			"*Soft-Solids.*"
	a, e, i, o, u.			
	2. *Ambigu's* (Half-vowels.)			
	h, y, w.			
III.	1. *Nasals.*			"*Liquids.*"
	ng, n, m.			
	2. *Oral Liquids.*			
	l, r.			

Correlated with the human body they reappear, thus:

1. Hobodo.	2. Wato.
1. Bones and Joints—"*Articulations*"—"Solids."	1. True Consonants—"*Articulations*"—"Solids."
2—1. Flesh-masses. } "Soft-Solids."	2—1. Vowels. } "Soft-Solids."
2—2. Viscera.	2—2. Ambigu's.
3. "Fluid" Parts.	3. "Liquids."

It is obvious that we are here on the road to the *anatomical* distribution of the human body, and its analogues, in language. Not only are consonants instinctively called "articulations," but the framework-words—written by consonants without vowels—in phonography are called, in the same way, "*skeleton* words."

The prior set of discriminations (elaborate) into aggregates and properties,—the motic properties, denoted by the participles, being

functional, or related to doing, and the aggregates being things, as agents or organs,—was, it may now be said, the *physiological* discrimination into organs and functions. (Observe that organ is not with any propriety an anatomical, but always a physiological, term.)

Finally, the wholeness aspect (*whole*-th=*health*) is hygiene. The proposition, or verb-locution, in language, is the lingual *individual*, equal to ihobodo, or the *individual* human body; the active voice (or vocation) being male, the passive, female, etc.

So we have here the basis of the fundamental discrimination in medical science into (1) Physiology, (2) Anatomy, and (3) Hygiene, and see the same discrimination extended, by implication and analogically, to language, and to all other domains of being. The fundamental pairings of discriminations within each are these:

In Physiology.	Organs.	Organology.
	Functions.	Functionology.
In Anatomy.	Bones.	Osteology.
	Flesh.	Carneology.
In Hygiene.	Male.	Sexology.—(Basis of Health.)
	Female.	

SECTION II.

Dental Education.

Report by J. N. CROUSE, Chairman.

IN presenting the report on "Dental Education," the Section must necessarily repeat many ideas and propositions which have been presented in reports of previous years, for the reason that many reforms which were advocated in those reports have not been adopted, and it is only by continuing to call attention to needed reforms that we hope to secure progress.

It is noticeable that nearly all members of this Section who have taken any part in its proceedings have emphasized this point: that a better preliminary education on the part of the student should be insisted upon before he is accepted as a student of dentistry. The Section would urge that some standard of preliminary education for students should be fixed by this Association, and by it recommended to the colleges, in the hope that they will adopt it, and thereby secure unanimity of action in this direction. Such action on the part of the Association would at least stimulate progress in this direction.

It is the opinion of the Section that the student, in addition to the knowledge and mental discipline acquired by pursuing such a course of study as is usually embraced in the curriculum of our best academies, should have some office-training and a preparatory course of reading, previous to attending lectures. This point is fully elaborated in another paper which will be read.

With reference to the colleges, the Section would earnestly suggest that they should insist upon a more rigid preliminary examination of students, both as to their character and mental acquirements, and that more care should be exercised, especially in their examination for graduation. This latter could be best secured by placing the examinations of students in the hands of regents selected from the best men in the profession, thus giving the profession a direct oversight and interest in the work of the colleges.

Upon the recommendation of this Section, the Association last year adopted the following resolutions:

"*Resolved*, That hereafter no dental college shall be entitled to representation in this Association that does not require a good English education as a preliminary qualification for its matriculants, to be ascertained by examination.

"*Resolved*, That the colleges shall hereafter grant no diplomas except to those who attend at least two full courses of lectures, excepting that practitioners of dentistry who present satisfactory evidence of having entered upon practice prior to July 1, 1875, and of having continuously followed the same from that date, shall, until July 1, 1885, be entitled to present themselves for examination for the dental degree after attending one course of lectures in a duly-recognized dental school.

"*Resolved*, That no dental college shall be eligible to representation in this Association that does not in its next annual announcement give notice of its adoption of this limit to the conferring of the degree."

The Section are now unanimously of the opinion that a higher standard of education would be attained if all the schools would require attendance upon two full courses of lectures before allowing the student to come forward for examination for graduation. In view of this fact, the Section would recommend the adoption by this Association of the following resolution:

Resolved, That in order to secure representation in this Association, dental colleges must, subsequent to October 1, 1881, require all students entering therein to take two full courses of lectures previous to coming forward for examination for graduation, and must also state these conditions in their next annual announcement."

[This resolution was adopted. See minutes.—Pub. Com.]

So far as the Section have been able to ascertain, the following schools have substantially followed the suggestions contained in the resolutions adopted last year:

The Dental Department of the University of Pennsylvania, the Dental Department of Vanderbilt University, the Boston Dental College, and the Western Dental College. The Dental School of Harvard University and the Dental Department of Michigan University were already carrying out the reforms referred to.

The Section feel confident that the respectable schools that have not already complied with the views of this Association, as expressed in the resolutions adopted last year, will surely do so soon, for no school that desires to have the educational standard higher can reasonably refuse to assist in establishing these much-needed reforms.

As to those schools that are not reputable,—which are a positive hindrance to educational advancement,—their methods should be so thoroughly exposed as to render them harmless.

The question, "is dentistry a specialty of medicine?" is again brought to your attention, and both sides are presented in different papers which will be read, rendering unnecessary the recapitulation of the arguments in this report.

SECTION II.—Continued.

SUPPLEMENTAL REPORT ON EDUCATION, BY T. W. BROPHY, OF THE SECTION.

ARTICLE III. of the code of ethics of this Association states: "Dental surgery is a specialty in medical science. Physicians and dentists should both bear this in mind."

Let us see whether a man who is a graduate from a dental college, but not a graduate in medicine, is entitled to the name of a specialist in medical science in the same relation that other medical specialists are. The time has not, nor will it ever come, when the medical profession will recognize individuals or a body of men as medical specialists, no matter how eminent and scientific they may be, unless they are graduates in medicine,—in short, medical men. Indeed, it would be as unreasonable for dermatologists, ophthalmologists, gynecologists, or other recognized medical specialists, to teach their departments, each as an independent profession, and expect to be called medical specialists, as it is to call the dental graduate, much less the man who has not received a dental college education, a specialist in medical science. A medical specialist must be *medically educated*, after which he may pursue any department of medicine which his inclinations or tastes may determine.

I do not claim that a man who graduates from a medical college is competent to enter upon the practice of dentistry without special training under efficient dental teachers. Neither do I claim that a graduate in medicine is competent to enter upon the practice of ophthalmology, or any other department of medicine, without long, careful, and well-directed special study.

There is but one way by which dentists can become medical

specialists, and that is by acquiring the broad foundation of a medical education, upon which every medical specialty must be based, the specialty of dental surgery included. Therefore the members of this Association should require their students to attend the prescribed course of lectures in a medical college, and graduate as Doctors of Medicine, before entering upon the specialty of dental surgery.

Unless this Association adopts this report, or such portion as requires all members to demand that their students graduate in medicine, or adopt some measure by which this clause may be carried out, I believe that it will be to our credit as a society to expunge from the code of ethics the clause, "Dental surgery is a specialty in medical science."

SECTION II.—Continued.

Supplemental Report on Education, by L. C. INGERSOLL, of the Section.

THE growth of the sentiment regarding a higher dental education can be traced to two sources: one, social science, the other, moral science. Out of social science springs the desire that the profession should rank higher in the social scale,—that it should stand higher in public estimation when compared with other professions. Out of moral science springs the philanthropic desire that the profession should be able to do better service for mankind in the prevention and relief of suffering, and in promoting health and long life. In the mind of one the social element is most prominent; in the mind of another the philanthropic element; while both alike look to education as the only legitimate means for realizing their desires. One looks to a more extended, thorough, and complete education of the man *in* his calling as a dentist; the other looks to a more thorough education of the man *out* of his calling, and before he enters upon his calling,—to that education which is designed to develop and train the mind as preparatory to those special studies which pertain to the dental calling.

Professional studies alone may secure in large measure the philanthropic aims of the profession, but will not alone secure the social standing we desire. Important and necessary service rendered to mankind is not the ground of our social claims. The servant class

render vastly important and necessary service to mankind, yet their social standing is low.

Civilized society the world over is stratified. Birth, caste, wealth, education, and political preferment mark the lines of the different strata. In this country wealth, education, and politics draw the dividing lines. In spite of all doctrines of equality proclaimed by constitutions, political platforms, creeds, sermons, and humanitarian schools, *higher* and *lower* are meaning terms, and indicate different degrees in the social rank. Equality of the human race is only known in embryonic and infantile life. The born king and the born serf are on an equality at the mother's breast, except for their clothes. The wise man and the fool sat on their mother's knee equals, so far as sense or science knew. Development makes them to differ, and development is education. *E duco*, a primitive form of words, from which our word "education" is derived, signifies a leading forth of the attributes, functions, and powers of man's entire being, and begins, in its most important sense, at birth. Air educates the lungs; food, the stomach; light, the eye; form and firmness of objects educates the sense of touch; sound educates the ear; sight, touch, and hearing develop thought; differences educate the faculty of comparison; repetition educates the memory; reflection, the reason; so on and on through the entire range of powers and functions embraced in man's physical and spiritual nature,—body- and mind-nature. Whenever, then, we talk of education, let us keep in mind this primary idea of *development*, of leading forth powers and functions to an objective activity. In the broad sense, the term education may as strictly be applied to man's physical nature as to his mental. When applied to the mental, it signifies a development of or a leading forth of the powers of the mind in active relationship towards their appropriate objects. It means activity and increase of power to act. It means advancing from less to greater power. It means increase of mind-resources.

Compare now this definition of education with the popular notion that education consists chiefly in storing the memory with long lines of facts, just as you force into the mind of a child that long line of unrelated letters we call the alphabet. The difference is just the difference between a store-house and a machine-shop. In the one all the material lies dead; in the other all the material is in the active process of being worked up to appear in new forms.

To memorize facts and propositions is a very important part of education; it is gathering together the material. It is the first step

in advanced culture, just as memorizing the alphabet is the first step in primary culture. But the alphabet, however thoroughly memorized, contains not a single idea. *Letters* must be put into relationship with each other before they can become meaning symbols of ideas. So, memorized facts and principles must be put in relationship to each other before they can have in them the educating element, in the better sense.

The mind as a receptacle of such material as we call knowledge, and the mind as a power capable of working up this material for practical use, are two different conceptions.

Every rule of the Latin grammar may be thoroughly memorized, but, for lack of the right sort of training, the pupil may not be able to apply these rules in the formation of a single Latin sentence. One may memorize a bookful of medical formulas and recipes, and be wholly incompetent to practice medicine.

In this enlightened age the world should have got beyond the idea that a man may start out from anywhere, at any period of his life, in any calling he may choose, gather up a bundle of facts and throw them out by the fist-full into the face of society, and pass for an educated man. Education means mental development, mental power, mind-force, and not an aggregation of scientific facts and fancies poured into the mind as a passive receptacle.

Every enlightened educator conceives it his business to train the mind to an active exercise of its faculties. Every mental endowment is put under discipline. Each faculty in its turn, observation, memory, reflection, reason, judgment, all come under the master's hand for training.

A man thus educated cannot handle anything without observing its nature; cannot see anything without reflecting on its uses; cannot listen to the enunciation of a principle without applying it; cannot hear a proposition without penetrating its meaning; cannot enter the field of argument and stop short of logical conclusions. This habit of mind is the key to knowledge,—theoretical, practical, and scientific.

Lead forth a mind thus trained into any of the practical ways of life,—into politics, religion, philosophy, science, commerce, trade, or mechanics,—and the conquest is easy and certain.

I have written thus much about education in a general sense, education as a primal idea, so as to be able to say with some clearness and force that a little specialized knowledge is *not education*.

To begin education in the dental college and end education in the dental office can never give to the profession the educational rank,

can never raise dentistry to the rank of the learned professions. General education will; special education will not. When we look forward to and hope for the elevation of the dental profession, we must seek recruits among the better educated class.

It is the mind and not the fingers that makes the man. It is the full-rounded mental development, and not mere manual dexterity, that creates the superiority of man among his fellows.

We are now prepared to consider the question, What is special education, or education professionally considered?

First, it means *education*. It implies the possession of mind with mind-capital,—mind-forces developed and active. The gaining of a special education means the application of one's native and acquired mental powers to some particular calling. It is taking the mind-capital of which one comes possessed and putting it to some profitable use, to some special work demanded by civilized society, in conducting which thought and learning constitute the chief capital. Success, then, depends upon having such capital to put into it. It is but a common-sense proposition in any financial business that a young man must first acquire capital before he can safely make an investment. So, mind-capital must first be acquired before a professional education can even be entered upon with any hope of success.

As regards the science of dentistry, its basal principles are as intricate as the nature of man, and as hidden as the forces of nature. They cannot be well understood and successfully applied without learning. Facts and principles are confusing to an untrained mind. It knows not how to arrange them or how to use them. Thus it will appear that one year of study for any professional calling with a mind well disciplined by a systematic education is better than two years of study with a mind undisciplined. More than that: the untrained mind studies *much* to no profit, comprehends little and acquires less, for each little is but a part of an unknown whole.

If, then, we would raise the dental profession in social rank and secure best its philanthropic aims, it can only be done by a deep and broad culture, such as educated men who have already acquired rank and position will recognize and respect. A skillful hand without the cultured brain can never make dentistry what it deserves to be. The habit of thought and investigation is far more important to the student of dentistry than any acquired skill of hand. Dean Stanley, during his recent visit to this country, said of the learned Dr. Robinson and his travels in Palestine: "Dr. Robinson had an eye capable of observ-

ing what was worth his attention, and a mind strong enough to enable him to put his impressions into a readable form. This excellence is due to Dr. Robinson's having *eyes to observe*, while others have had eyes *not to observe*."

It is this education of the faculties that qualifies a man to get knowledge. To know is first to have the faculty of knowing. To know dentistry is first to gain the capacity to know it.

In this view of the subject the elevation of the rank of the dental profession depends far less upon the curriculum of study in a dental college than upon the curriculum of study before entering the dental college.

It is conceived by some, perhaps by very many, that the preliminary course of study as a qualification for the study of dentistry should be a full medical course. However great a store-house of scientific facts the medical school may be, the amount of scientific knowledge the medical student brings away as a foundation on which to build the systematic structure of practical dental science depends upon his mental qualifications. If he goes into the medical school an ignorant, untrained boy, he comes out such. If he has never had reason and judgment cultivated, and has not acquired a quick apprehension of principles and a discernment of related facts, I would much rather the student should spend two years in a well-equipped academy than two years in a medical school as preparatory to entering upon the study of dentistry.

Is dentistry a specialty of medicine? I answer yes, and I answer no, for the question will admit of both an affirmative and a negative answer. If by medicine is meant that broad science which teaches the nature, functions, and whatever else is known and knowable of man's entire physical organism, I will accept the affirmative answer. Dentistry *is* a specialty of that broad and comprehensive science which brings within its scope the whole of man's physical nature, for dentistry pertains to a *part* of man's physical nature. It has for its purpose the investigation of a *part* of the human structure, the unfolding of the laws that control the development of the structure and lesions to which it is subject.

When the science of medicine is spoken of in its fullest and most expanded sense, it may be made to include dentistry and all other specialties that make any part of the physical man a subject for scientific research.

But there is no such use of the word in common parlance. The term medicine, as applied to a department of science, unless otherwise specifically defined, must be understood in its popular sense, and *is* generally so understood. In this sense the term medicine means the teachings of the medical schools, medical text-books, and medical literature,—*that* science which is taught as a basis of the medical practice, and is represented by the medical faculty, and by the recognized medical profession of this country. Medicine in the broad sense is *anthropology*, the science of man. Of this science medicine, as popularly understood, is itself a *specialty*, in the same sense that dentistry is a specialty. Both draw their facts from the same broad field, man's physical nature.

The phrase *specialty of* means *part of*, or a *department of*. Who can pretend that it has ever been even the *smallest part* of medical teaching in the schools of medicine to qualify the student for the practice of dentistry?

Who can pretend that there is to be found anywhere in medical text-books, or in general medical literature, any basis on which to build a dental practice? Who can pretend that there is anywhere in this country a medical faculty who by their college lectures, supplemented by the private teaching of the best strictly medical preceptor, could ever qualify a student for the practice of dentistry? By what authority, then, is dentistry to be declared a *part of* medicine, a *department of* medicine, or a *specialty of* medicine?

If dentistry has been forever ignored by the schools of medicine; if its paternity cannot be traced to college faculties and the medical profession; if dentistry has become an established science from sources outside the medical faculty and medical schools; if, after centuries of medical teaching in well-endowed medical schools, dentistry has been compelled in the nineteenth century to establish its own schools and open new fountains of knowledge; if it has established a profession based on scientific facts never known to the medical profession, and has correlated these facts into a science and proved it by a systematic practice—demonstrated not on the cadaver but on the living subject—we should be ashamed to seek its paternity where it is not to be found, merely for the sake of honorable mention. It is a sign of feebleness and weakness to ask for the mantle of a time-honored ancestry to cover us. Much better for the dental profession to claim that we came forth, Adam-like, out of virgin soil.

Medicine, though not the recognized father of dentistry, may rightly be esteemed its elder brother, having the same ancestry. Far back

in the genesis of science, out of the womb of the remote past, medicine and dentistry were born twins. True, medicine, like Esau, was born a little first; but dentistry, like Jacob, came forth having fast hold of Esau's heel. Medicine being thus the *first-born* was considered the *proper* child, and was nursed at the breast of queens and fed on the best milk of the passing ages; while dentistry was left, like Romulus and Remus, to be nursed by a wolf. When medicine had come to be centuries old, dentistry was still in swaddling bands. If in neither ancient nor modern times medicine and dentistry have stood in any other relation to each other than that of independent brotherhood, it is a confessed weakness in the day of our strength and honorable standing to ask that medicine shall belie the relationship and all past history even to own a worthy progeny.

DISCUSSION.

Dr. Allport: So much has been written and said in regard to the subject of dental education, that to some it has become threadbare and hackneyed; but as correct practice must depend upon the proper education and training of those who practice, we ought never to tire of expressing ourselves in such a way that the best thoughts upon this subject will be well understood and acted upon, not only by the younger members now in practice, but especially by those who are about entering our profession as a life-calling. Some are inclined to censure our colleges for the lax manner in which they give instruction and their low standard of graduation; but in this, as in other matters, it is easier to blame than to mark out a course of improvement. While it is clear, in my mind, that the time has come for a changed mode of instruction and improved qualification, too great thanks cannot be expressed for what our colleges have so far accomplished. To my mind, nothing is so much needed at the present time as an absolute division in the practice of dentistry. Those who are engaged in artificial dentistry should be educated in that department and follow it exclusively, and those engaged in dental or oral surgery should be educated in and follow that as a distinct calling.

A medical education, supplemented by special instruction in dental surgery, must be the foundation for correct practice in that branch of the profession, and a diploma from a respectable medical college should be the first requisite for matriculation in a dental college, or special instruction in that department. No one can doubt that this

system would better qualify the oral surgeon for the practice of his specialty than the *partial* medical education now in vogue in our dental colleges. None feel the need of this so much as the older members who entered upon the practice of their calling without it. When this mode of instruction and change is suggested to teachers in our colleges, the objections urged are that more time will be required, and that it will be difficult to get young men to adopt it, and that the community expect the dentist to do all that is required, whether it be dental surgery or artificial dentistry, and that people will not go to one practitioner for services in the former department and to another for the latter. The first objection is good, and will continue to hold good so long as both branches of the profession are included in the same course of instruction and students are required to qualify themselves in both branches before graduating in either. If the time devoted to the teaching of mechanical dentistry in our colleges were employed in acquiring a thorough medical education, supplemented by special instruction in oral and dental surgery, but little more time would be needed to thoroughly qualify students to practice dental surgery as a medical specialty than is now taken to partially qualify them to practice in both departments. The advantages gained by this change would be so great that I cannot see why the objection urged is valid.

If dental surgery is a specialty in medical practice, as we are so apt to claim, surely the foundation for its practice should be laid in the broad and most approved teachings of that science, which is best secured from standard medical text-books and in regularly-organized and fully-equipped medical colleges. A knowledge of the general principles of law is essential to the intelligent practice of criminal, admiralty, or any other special branch of the legal profession. No one would be allowed to practice in any of these departments without first passing an examination in the fundamental principles of that science. Nor should any one be regarded as a special practitioner in any department of medicine without careful and thorough teaching in the basic principles of that science.

No one can make a good, practical artificial dentist without first receiving careful and thorough instruction, not only in the principles of mechanism, but in the essential principles of art. Complaint is justly made of the low standard of artificial dentistry; but considering the meagre instructions given in our colleges, my wonder is not that the standard maintained is so low, but that it is as high as it is.

To follow the calling of a mechanical or artificial dentist properly,

the practitioner should have a reasonable knowledge of the anatomy of the parts about which he works, as well as of chemistry, including metallurgy and the laws that govern mechanics; and he should be specially instructed in applying these principles in this, one of the most difficult branches of mechanics. A good mechanical dentist must understand how to put up teeth on rubber, celluloid, gold, the various cast metals, and the finest of all artificial dentistry, porcelain continuous-gum work on platinum. He should be able to so adapt these various kinds of work to meet the exigencies of cases presented, that, in a mechanical sense, the greatest benefits possible may be derived in masticating. It will not be maintained by teachers in our dental colleges that the instruction given is sufficient to thoroughly qualify graduates to so put up work by these various methods as to give to their patients the greatest benefits attainable. But little attention is paid to any kind of work except rubber and celluloid, the cheapest and lowest grade of dental plates known. Few, indeed, of these graduates can do acceptable work on gold, much less platinum. And too, too many of our teachers are as poorly qualified to put up these higher grades of work as are the graduates they send forth. The result of this inferior instruction is a very low grade of mechanical dentistry, and it will exist just as long as the present mode of teaching and mixed practice prevails. No man can learn to make a good pair of boots or shoes, or a set of harness, or even a shirt, in six months' teaching; and yet our teachers will hardly claim that more than this length of time is devoted to the teaching of mechanical dentistry in our colleges. Regarding this branch of our practice simply as a mechanical calling, the man does not live who can thoroughly qualify himself to render to his patients the service they are entitled to, with anything less than two years of the most careful practical instruction. But a set of artificial teeth should not be regarded simply as a mechanical fixture. Their proper construction requires the application of some of the higher principles in art. Artistically considered, a set of artificial teeth should be so adapted in color to the age and complexion of the wearer, in size and contour to the shape and expression of the face, as to attract no more attention than does the nose, the eye, or the hair. The fact that they are artificial should be concealed, and this can be done by no one without a knowledge of contour and the proper blending and harmony of colors, acquired only by a careful study of the principles involved in art. But the fact is, that however closely the manufacturer of artificial teeth may copy nature in those thrown upon the market, the

great lack of artistic knowledge among a large majority of dentists renders most sets of artificial teeth, in the mouth, conspicuous advertisements of the fact that the dentist who put them in is as ignorant of art as he is of the contents of the moon. And if students in mechanical dentistry would devote to art-study the time now spent in procuring a partial medical education in our dental colleges, that calling would soon assume its proper place among the higher branches of professional art.

The other objection to this division of practice is equally untenable; for people have but to be educated in the matter to learn that the greatest skill can only be obtained from those who devote their study and time to the perfection and practice of these departments separately. When we have properly qualified mechanical dentists, and they have offices by themselves for the exclusive practice of their calling, the dental surgeon will not be required to do this class of work, any more than the surgeon is to make artificial limbs or eyes.

If this question could be properly discussed by the great educator of the people, the newspaper press of the country, the public would soon become so educated upon the subject that they would as soon think of going to the general surgeon for artificial limbs as to the dental surgeon for artificial teeth: and certainly no one would think of going to the maker of artificial limbs for surgery. The greatest excellence is always gained by subdivision of labor, and in no field could we look with greater hope for development and skill, by division, than in the study and practice of the two departments of dentistry.

Dr. Morgan: Perhaps ten or fifteen years ago, when this matter was first mooted, after some immature thought upon the subject, I went upon the record as in favor of the divorcement of the two branches. I have since then had cause to change my opinion, and the more I think of it the more impossible it seems to be to accomplish the object; there is such an interlacing of the two that it seems to me impracticable for it ever to be brought about. The mechanical branch of dentistry so interlocks with operative dentistry or oral surgery, in the correction of irregularities of teeth, for instance, that it seems to me an impossibility to separate them. The dental surgeon who undertakes to correct a set of irregular teeth should not only be able to devise in his own mind the means by which he proposes to accomplish it, but he should be able to construct his fixtures for that purpose. I take it that the man who desires the accomplishment of a certain end, and understands the means by which it can be done, can, if he has good mechanical skill, produce the apparatus

needed in greater perfection and with better adaptation than can the outside mechanic who does not understand the principles upon which it is to be applied; in other words, that the dentist who understands the construction of appliances can make a better one for the correction of irregularities than it is possible for any mere mechanic to produce.

Again, you can no more separate artificial dentistry from dental surgery generally than you can separate medicine from the practice of dentistry. None of us claim to practice medicine, and yet constantly cases come into our hands which require us to turn to the medical art and apply its principles in our practice. For instance, a patient comes into your office in trouble with, perhaps, an incipient abscess. You look at the case, examine your patient, and find his general condition to evince a tendency to inflammation. You do not think in such a case as that of calling in a regular physician to give him general treatment, but with some mild treatment you send him away, with the expectation of seeing him come the next day in better condition. All of us are compelled from time to time to administer medicine addressed to the general system. It is so inconvenient and sometimes so impossible to make medical men understand the condition of the patient, that you are necessarily compelled to administer medicine yourself.

In the same way it seems to me these two branches of dentistry are so interlocked with each other that it is impossible to separate them. Besides, sometimes artificial substitutes have to be applied in mouths that are in a pathological condition. What are you going to do in such cases? Are you going to turn your patient over to an ordinary mechanic who knows nothing of the condition the mouth is in, who understands nothing of pathology?

That is not the way an intelligent mechanical dentist performs his duties. It seems to me that the two branches necessarily interlace, and that dental education should be based upon medical science, and then the principles of mechanics as far as they apply should be studied, and the two blended together for the accomplishment of the highest results.

Dr. Buckingham: I take the ground exactly that Dr. Morgan has just taken, that the two branches are so interlocked with each other that it is impossible to separate one from the other.

It is very evident, from what Dr. Allport has said, that he has not considered what is and what should be taught in the artificial branch. It is not merely the manipulative part of making a set of teeth, the

mere mechanical operation of putting them together, but there are other things that should be taught to the mechanical dentist.

In that branch the principles of mechanics are taught, and not only those principles, but the expressions of the face are taught. We had quite a number of lectures in our college upon the anatomy of expression,—the different muscles that are brought into play. We have also lectures upon the anatomy and structure of the voice. These all come in, as well as the expressions of the face. There is no place that this can be taught more appropriately than in some public institution. If you choose to separate the profession and make a mechanical branch and an operative branch, it would be very well; but they are not so extended but that they can be studied together, and, as Dr. Morgan said, they must necessarily interlock and go together in practice.

We do not profess to be able to make a man thoroughly perfect in the operative branch and turn him out in the condition of a man who has been in the practice thirty years. We want to teach him the principles, teach him why he saves teeth, and how it is to be done; and when he has learned that he goes into practice.

We talked yesterday morning about packing gold and putting it in, one piece after another. There was no principle involved in it,—there was no reason why one saved the teeth better than the other, except that one might be more perfectly put in than the other. It was a mere mechanical discussion throughout the whole. What we want to teach students is the principles as well as the practice, as far as we can, because you cannot make any man perfect in a very short time. Teach a man the principles of law, and he goes to a court and is admitted as a practitioner; but no one will suppose that the young lawyer is as competent as Daniel Webster after he had been fifty years in practice. A young minister will go out from his school, and he comes into the pulpit and delivers a good sermon; but no one believes that man to be the same as he will be forty or fifty years after; and yet it is expected that the dental student will go out with all the accomplishments of his profession. The schools are but the nursery; and I will put it to any reasonable man if any school is not better than most private offices we have to-day.

We know it is the case that the very best dentists we have do not take students, and where are the students to go? Dentistry is growing gradually. Men who are around me now, who saw dental colleges twenty or thirty years ago and compare them with what they are at the present time, will be surprised at their progress. They

are now advancing dentistry as fast as any other of the branches of science. The system is not perfect, and will not be perfect in our generation; but we are possibly growing faster than any other profession that is now in existence.

I am opposed to this process of separating, and I am opposed to another matter. There was a little article I saw at the head of a paper the other day that struck me very forcibly: "If you want any information about any kind of business, go to somebody that never was in it." There is no business in the world but that there are surrounding persons who can tell how much that business might have been improved if only some two or three things had been adopted.

The field of dental education is open wide. We are doing all we can, and we want the sympathy of the profession. We have got nothing but discouragement from these conventions all around.

They have found fault with us. They pick out every little flaw, and many things from reports outside that were not true. They never come to see us with one word of encouragement, they never give us one dollar of assistance, and yet they come here and complain about us for doing bad work. It is not fair. Some of us have devoted the greater portion of our lives,—twenty-eight years have I attempted to teach dentistry, and to do the best I could by it,—and this is all the satisfaction we get. It is not money. Everybody knows we do not expect to get money. If we do wrong, come to us kindly as you would to a brother, according to the scriptural rule, and show us wherein we are doing wrong, and then advise with us, and we will do very much better; but if you scold, we get crooked, and don't do any better than we did before.

If we were to build up a model student, and had the privilege of educating him before he came into the college, we should probably give him a very much better dental education than we now do. We must take the material that we can get. They accuse us of turning out material that is not good. We have many men who prove to be humbugs after they get out. Does not every institution in the country, medical, theological, and everything else, contain men that are naturally born quacks, and will be quacks all through, and some of the greatest quacks are those that are well posted!

We cannot control a man after he leaves college. Give us encouragement, and let us work and do the best we can.

Dr. Stockton: I do not think it is quite true that we come here to find fault with dental colleges. It has been said that our profes-

sion owes more to-day to dental colleges than to anything else. I think that is true. There is one thing where I think there is a wrong. Dental colleges are not responsible for it, but I think we as dentists are. There is a law in nearly all our States regulating the practice of dentistry, and there are more coming into the profession through the State examining boards, I think, than almost any other way. The general education of the young men coming before examining boards is not such, in a large majority of the cases, as to qualify them for dentists; and, too, the examiners in many cases have not that practical experience in making examinations that will enable them to ascertain whether these young men are qualified or not. Some of the examining boards do not require any really practical examination. Some who come into the profession in this way get in by the "skin of their teeth," and then they "skin" the teeth of their patients. I think that is the great trouble in dentistry, that so many are coming into the profession through examining boards, I may say through the back door, instead of going to the colleges and coming through them and being "men among men."

If they could all go to college and stay there two years, I tell you it would be better for them; there is no doubt about it. They cannot go through,—I do not care how little the professors know,—they cannot stay there for two years and hear the lectures on the different subjects unless they are made the better for it, and I think the wisest thing that can be done is for us to put our discouragement on these examining boards.

I know of young men who have passed the examining boards who cannot write a sentence correctly, and yet they are recognized as dentists by the law of the land. Our dental colleges should be sustained, in order to bring our professional standard yet higher. I am glad this preliminary education has been talked of. The higher the education of the man when he enters dentistry the better dentist he will make, and the more useful citizen, too, will he make in the community.

Dr. Moore: Much has been said in relation to our dental colleges, and as Dr. Buckingham has very truly remarked, they have not received that encouragement to which they are entitled. While I do not claim that they are perfect as they now exist, yet in reviewing the history of the dental profession for the past fifty years, noting its unparalleled progress and its vast influence of to-day, as compared with that of a few short years ago, we are led to inquire, to what can be imputed this stupendous growth, strength, and influence, if it

be not to the dental colleges? You cannot accredit it to anything else. True, we acquire much knowledge through dental associations, periodical literature, and in various other ways, but the majority of us receive our first impulses to move to a higher standard from the dental colleges.

The principal reason why colleges turn out bad or indifferent men as practitioners arises from the fact that they have bad or indifferent material with which to work. Since a majority of the best men in the profession refuse to take students, it stands to reason that, as a general rule, they (the students) come to the colleges through a lower grade of operators, and in many instances are devoid of a proper education. So let us not pull down these institutions of learning that have done so much good, but rather foster their interests, and encourage them to higher attainments by sending to them only WELL-EDUCATED, COMPETENT, and REFINED students.

As Dr. Stockton has remarked, a great many States have dental boards. Now, in our State (South Carolina) we have a law regulating the practice of dentistry, and a board of dental examiners, of which I have been a member for the past five years, during which time we have not granted a permanent certificate to any one. We have pursued the plan of granting a temporary license to practice until the opening of the colleges, and advise the licensees to attend lectures and perfect themselves. And I believe if this course were adopted by all other State boards of dental examiners it would be found the wisest, because a man who has not availed himself of every opportunity of acquiring all the knowledge that is attainable of a profession which he intends to practice has no right to a license to practice that profession, be it dentistry, medicine, or anything else.

Dr. TEMPLETON: I have heard nothing practical suggested to remedy the state of things in the dental profession at the present time. I think Dr. Buckingham spoke the truth when he said the colleges have to take such material as is sent to them. What is the reason that such material is sent? All over this country dentists are taking into their offices boys to attend to the drudgery and act as assistants. Finally these boys take a notion that they would like to become dentists, and if they go to dental colleges, having been taken into the office without any qualification or preliminary education, they will be graduated without having had the proper foundation laid.

How are you going to remedy this? How many local organizations have any rules or regulations restricting their members? I

would ask, can a young man enter the office of any attorney in the city of Boston without passing an examination as to his qualifications —whether he will be accepted as a student? I think not.

I know it is so in our city, and it is also true in the medical profession in all the cities. A young man cannot become a student in the office of any physician without passing an examination in regard to his literary qualifications.

For three years I have advocated this idea in our own local society, and a little over a year ago I succeeded in having a committee appointed to draft resolutions, which were adopted by our association, which provide for an examination of students in certain branches before their admission as students.

I have had several applications from young men to become students, and in the last two or three years I have rejected five or six because I thought their educational qualifications were not sufficient. One young man came to me and wanted to know the terms on which he could be taken as a student. I told him before we talked about terms I wanted to know as to his education. He said he thought he had a pretty good education, and told me where he went to school. I asked him what he had studied. He said reading, grammar, arithmetic, and geography. I asked him if he had any means by which he could obtain a better education. He said he thought he had. I advised him to go to school two or three years. He did not like that, and did not ask me anything more about terms. That young man went to Philadelphia and attended two courses of lectures, came up for graduation, and failed to graduate.

I had another application. A young man came to me and I asked him the same question; told him I thought he had better spend three or four years attending some good school, study the languages and some of the sciences, and then, if he wished to become a dentist, he was still young enough to begin, and I thought he would be much further ahead at the end of ten years than if he did not take that course. My advice was too much for him. That young man in sixteen months afterwards came home with a diploma, and is now practicing in the city of Pittsburg.

The following are the resolutions to which I referred:

WHEREAS, The profession of dentistry now suffers and has suffered in the past from the empiricism of many of its practitioners; and

WHEREAS, The dentist occupies the position of a public teacher; his education should be such as to enable him to give a satisfactory and scientific reason for what he does or proposes to do; therefore,

Resolved, First. That an applicant for the position of student in the office of any member of this association shall not be less than eighteen years of age, be of good moral character, and shall furnish satisfactory testimonials of the same.

Second. A diploma from any chartered literary institution shall be deemed sufficient evidence of an applicant's preliminary educational qualifications.

Third. The minimum preliminary educational qualifications shall be a thorough knowledge of orthography, reading, writing, arithmetic, grammar, and geography, together with a knowledge of the Latin grammar, and ability to read and translate a selection from any of the first five books of Cæsar's Commentaries.

Fourth. That an examining board, composed of three active members of this association, be elected at each annual meeting. The duty of said board shall be to examine all applicants for admission as students to members of this association. After examination of an applicant each member of this board will be entitled to ten votes, the applicant to receive twenty votes to entitle him to become a student.

Dr. Barrett: I desire to say a few words concerning the connection between medicine and dentistry. It is useless for us to attempt to strut about in borrowed plumes. We can deceive nobody. Let us be honest and look the matter squarely in the face. Because the teeth are a part of the human anatomy, and a certain class of persons perform certain operations upon them, or make appliances for their cure or comfort, shall these therefore be classed as medical men? do they thereby become members of an old and venerated profession? If so, then may shoemakers on the same grounds claim admittance to the profession. If so, there *is* no medical profession, for old-established landmarks are at this one fell swoop broken down. It would be pleasing to us and flattering to our vanity could we thus cheaply earn so valued a privilege, and thus quickly secure a professional standing which physicians have spent years in gaining. Every cross-roads peripatetic tooth-tinker a member of the medical profession! Why, of what are we thinking? Are doctors thus easily made? I tell you there is but one door of admission into medicine, and that is the front door of a reputable medical college. Medicine acknowledges but one form of credential, and that is an honestly-earned medical diploma. Any affiliation which we may gain, notwithstanding a similarity in practice, must be by first becoming medical men ourselves. We cannot practice a specialty *in medicine* except we first qualify for the practice of the general science in which we desire to become specialists. Will an ophthalmologist, a gynecologist, a surgeon, be acknowledged by medical men if he attempts the practice of his specialty before he has qualified in general medicine? And should we as dentists claim what is accorded to no other class

of men, even though they practice a specialty much more nearly related than is ours? We must take higher ground. We should scorn to attempt this sneaking burglary into an honorable profession. If we are to be medical men, let us each and every one secure the proper credentials. Then there will be no caviling at our claims to recognition. When we have passed the full curriculum of medical schools and secured an honorable place in medicine, we may *then* go out in any specialty we may choose and retain our standing. We may then claim to be specialists *in medicine*, but nothing short of this can make us so.

Our dental colleges have done a wonderful work. I yield to no man precedence in giving honor to our schools, but they are not what they might,—what they ought to be. Nor are our literary, our medical colleges yet perfect. It is sufficient encouragement, however, to know that they are improving every day, and the fact that the condition of our dental schools is a matter of much anxiety to the thinking part of the profession, that one section of our most important society is given up to the consideration of the state of education, is ample proof that the profession is not satisfied, but desires to make yet further advancement. We are rising, step by step, and can see the men who, on the mountain-tops of progress, are illuminated by the dawn of the coming day. In my humble opinion the future of dental education lies in the direction of the university. The time must come when the segregated schools must be abandoned, or linked with medical schools or universities, because in those institutions may be found the greatest facilities for study. Great universities possess laboratories and museums and apparatus which smaller institutions cannot afford. Segregated dental schools, for instance, cannot teach anatomy, or physiology, or chemistry as thoroughly as can schools more entirely devoted to such studies, and therefore, to my apprehension, does the future of dental teaching lie in a union with them, that the same professor who has devoted his life to that department, may teach the student in medicine and art and dentistry the same thorough anatomy or chemistry, leaving to special professors the teaching and properly equipping of the ophthalmologist, or dermatologist, or dentist, in his special study. The only possible source of regret may be that, in the accomplishment of this tendency, the old teachers who have grown gray in gaining experience do not cast in their lot with the universities, and continue what they have always been, the leaders and directors in the cause of professional education.

In saying these things I do no injustice to our excellent dental schools. It is to them we owe the very fact that we are a profession to-day. That American dentistry occupies its present high position is due to the old dental colleges, and to the self-sacrificing men who have labored in and with them. But the time is coming, and even now is, when something more is demanded,—when that which has sufficed for the past, that which was even far in advance of the demands of its day, is insufficient for the wants of the advanced profession. Those men who established the dental colleges builded far better than they knew. They laid foundations so broad and so deep that the superstructure which they reared does not cover them. A few years since dentistry did not demand educated men. The dentist was considered simply an artisan, and it was as absurd to demand a preliminary education in him as of a shoemaker. But to-day far weightier responsibilities rest upon him. To him are intrusted important interests and operations unheard-of a generation since. He is supposed to be a gentleman, and to be the companion of gentlemen. He must be versed in matters which imperatively demand a trained mind and educated brain to comprehend, and therefore the great prerequisite to the becoming a competent dentist is a good, liberal education,—a *preliminary examination* before entering upon dental practice. This fact is fully recognized by our English brethren, and to-day they acknowledge no institution that does not require such preparation.

It is a long step in advance when dentistry is acknowledged by the universities, and is given a place within their walls by the side of medicine, law, and theology. It is a recognition of its importance, and of the fact that the world makes the same demands upon its practitioners for intelligence and familiarity with the broad field of general science that it does upon lawyers and preachers. We who are of such recent origin are put in familiar companionship and on terms of perfect equality with those great professions which have existed since men were subjected to illness of the body, oppression by the stronger, and a haunting dread of some possible hereafter. Law, Medicine, and Theology have carefully kept their doors guarded, and jealously resisted encroachments by other guilds from the earliest ages to the present time, scarce admitting Art to a fellowship, and now, wonderful to relate, they meet us on equal grounds. Can any one say this is no advance? It only remains for us to rise to the exigencies of the occasion, and prove by our acts that we are worthy a place among the learned professions. To do this we must demand

of dental students yet higher attainments. We must furnish to them opportunities for full scholastic training. They must enter the lower doors of a universal institution that shall have the facilities for advancing them through all the several grades, until it finally graduates them educated men, and competent, thoroughly equipped dentists.

Dr. Wetherbee: All the remarks that have been made to-day ignore entirely the very thorough teachings in dental colleges of anatomy and physiology. The whole drift of the argument has been an entire ignoring of this fact, also an entire ignoring of the most thorough and practical teaching of the principles and practice of surgery, as though these were not taught practically, and could only be taught in medical colleges; also the ignoring of therapeutics and pathology. It appears to me that these medical branches can be as thoroughly and efficiently taught in a dental college as in any medical college.

If therapeutics receives proper attention, does it not cover sufficient of medicine to prescribe for certain conditions of the system which are made known to us by certain indications?

I wish to claim for these colleges the credit due them, and I wish, furthermore, to claim this fact,—that every intelligent medical man throughout the length and breadth of the country will acknowledge, —that the practice of medicine is empirical. Our highest, best-educated men in medicine declare this to be so; and if we turn back the wheel of time and note carefully the practice of medicine, and the ten thousand and one times positions have been changed,—to-day a principle accepted, to-morrow doubted,—it will give us a full assurance that the practice of medicine is empirical. And now there is a claim made that we must come up and adopt this empirical child.

Don't understand that I am for a moment contending or pleading for a partial education. My sentiments are too well known by this Association for you to accept for a moment that belief, but we have evils to contend with.

It is necessary to dwell upon them until our dental societies shall cease to take back tracks, until they shall come up to the position requiring every man to have a diploma in order to obtain membership in our societies.

Massachusetts, a few years ago, in her society, established the rule that no man could become a member unless he had a degree, and for some purpose (not unbeknown to me) they abandoned that position and let in everybody that wished to come in.

By this retrograde action we struck a blow against the progress

of dentistry, and until dentists shall come up, as a general thing, and put their foot upon this reception of students in private practice, societies, and colleges,—unless they have a good preliminary education,—we shall be hindered in our work.

But give the dental colleges credit for what they have done. The Boston College, which I represent, no longer receives students except for two years, and they must pass an examination before they can matriculate, requisite to admission to a thorough high school. Does that simply mean a school of lower grade? No: the best high schools. We intend to follow this rule of action and shall maintain it. We have placed ourselves in the line of progress for the purpose of making better men and better dentists.

SECTION I.

Artificial Dentistry, Metallurgy, and Chemistry.

Report by C. S. STOCKTON, Chairman.

SECTION I. has no report on chemistry or metallurgy, but is pleased to record a growing interest in the department of artificial dentistry that is encouraging.

Dr. Kingsley, in his recent work on oral surgery, has called attention to the necessity of this department of our art assuming a higher position than is accorded it in our profession.

Articles have also been commenced in the *Dental Cosmos* upon this subject which promise much in awakening an increased interest in this department. While the older methods of work have undergone no great change during the past year, we report improvement in the working of celluloid that renders this base more certain in its results. The improvement is the perfection of the new mode of celluloid machines invented by Dr. Campbell, by which the celluloid undergoes a process of curing while the plate is being pressed, the material thereby being made much harder and much less liable to discolor or warp while being worn.

In the manufacture of teeth there is a decided improvement in the forms of the bicuspids and molars, some of the manufacturers having the courage to attempt the introduction of the *natural* forms of these teeth, though the best of these attempts leave much to be desired. The first superior bicuspids are still smaller than the second; such arrangement is contrary to nature. The cuspids are also manufactured of the same shade as the rest of the denture, instead of being yellower, as nature makes them.

As many are advanced in years who require our services in this department, we would suggest the manufacture of teeth that will represent the effect of *wear* upon the cutting and grinding surfaces, and exhibit the effect of use often noticed upon these surfaces.

There are at present no such teeth to be obtained in the dental depôts, so that in partial cases we have only recourse to means that will glaringly exhibit the artificiality of our work upon the slightest exposure. A change in these respects is earnestly recommended.

We would also call your attention to the new metallic base, "Reese's Gold Alloy." This is a cast base, and promises much in the way of accuracy of fit and a better health of the mouth.

With every encouragement to continued advancement in this department of Section I., this brief report is respectfully submitted.

SECTION I.—Continued.

Essay, by EBEN M. FLAGG, of the Section.

Dental Art.

THERE is an element which enters into the conception and execution of every branch of our labor, and more or less forms part of every operation that we are called upon to make, be it surgical, operative, or prosthetic. This element lightens our drudgery, enlarges our souls, gives individuality to our work, and brings a satisfaction to ourselves that fully repays the time spent in fulfilling its requirements. It was born with our race, and has inseparably accompanied every movement that has brought happiness or comfort to man. It has contributed its share toward raising the physician from a mere "bleeding, physicking, leeching" animal to the position he occupies to-day, and has shown the mechanic and inventor that if he would be great, he must be more than an *artisan*. He must be an artist. This element, the element of art, wherever it enters the field of human life, has for its function to finish and render attractive the hard labor that preceded it. Thus we do not find it in its full manifestation, except in those departments of labor which have attained scientific certainty.

Nearly all professions have had for their origin the desire to relieve some present distress, moral or physical, and it is only after this desire has been accomplished that the element of art can enter and embellish that which was born of distress. *Our* profession is no exception to the general rule. We see in the operation of gold filling that men of genius are dissatisfied with the mere work of

stuffing a cavity full of soft foil that an excavator can penetrate to the base, and they do not consider the operation complete until the mutilated organ has received that form which nature gave it, and the eye is not offended by straight lines and vacant spaces which were never designed to exist. Yet there was a time when this soft-foil stuffing was supposed to subserve every purpose that could be required of gold filling, and it seems there are men to-day who apparently pray to be delivered from the impious wish of ever knowing more than their ancestors did upon this subject, and who eagerly bring to light and comment upon every blunder made in the effort of "restoration." I would call the attention of such to the words of one of the greatest art critics, John Ruskin, "I like to see a blunder, for *that* shows me that there *has* been an effort."

We find that the necessity for art in dentistry exists in proportion to the hopelessness of the case. The greater the amount of lost tissue to be replaced, the greater the knowledge of *natural* form required to properly effect its replacement. Beginning with the restoration of portions of teeth through gold fillings, we come to the loss of the entire crown, and, finally, to that last resort, the replacement of the entire denture. Knowledge of form and color, of expression, character, and effect, now becomes imperative to the dentist. To relieve the condition of his patient, the arts of the sculptor and colorist must be studied with more care than many of us are wont to give them, while a knowledge of temperament and physiognomy becomes an important element in our work. The patient, through the loss of his teeth, has not only suffered himself, but a wrong has been perpetrated on his fellow-beings through broken natural law, and he must not be permitted to give pain to others through the exhibition of a hideous deformity; for it is not *vanity*, but a duty we owe our fellow-beings that we look as well as possible; and we, as dentists, who have been obliged to study *physiology* that we might understand *pathology*, must now study beauty to avoid ugliness, and nature, that we may avoid what is unnatural.

The only way in which we *can* study nature with satisfaction is to court her with such earnestness that she will bestow upon us her favors and make known unto us her hidden parts. We should copy and reproduce her healthful forms as do men in any other department of art, and keep them carefully in our laboratories for reference and study. If an irregular denture is to be made straight, there is often no greater help to that end than a model taken from a plaster impression of a regular denture of corresponding age and size. A study

of this model will often in one moment give a better idea of the changes required in the mal-positioned denture than hours of unaided exercise of the imagination.

If a complete denture is to be made, another model, taken from a plaster impression of a complete set of natural teeth in the mouth of a patient of corresponding age and temperament, will lighten our task and prove to us an invaluable guide. These models are not very difficult to obtain. Often a lady patient will feel complimented at being asked to give a sitting for an impression of her perfect mouth, if it be asked in the right manner and she knows it is to be used in the interests of science, and to assist in relieving her more unfortunate fellow-beings.

It has been my plan, after taking impressions for study, to label each model with a description of the person it represents. The temperament, age, sex, and color of hair and eyes are noted, and two porcelain teeth selected to accompany the case, one to correspond with the color of the canine tooth and the other the remainder of the teeth on the model. It is sometimes a good plan to paint the incisors and canines of the plaster model, so that their relative colors may be seen, and I have found these models useful not only in regulating teeth and constructing artificial dentures, but also in shaping contour fillings where the rubber dam conceals corresponding teeth, and where we cannot turn the patient's head in such a manner as to get the shape of the tooth from different points of view, so readily as we can a plaster model. If students will commence the study of their art by carefully collecting models from plaster impressions, the education obtained from studying them would never permit the acceptance of the China-ware for which (and I say it with regret) a demand has been established at the dental depôts. I have been struck with awe at the shapes of some of the bicuspids and molars exposed for sale, and believe that, without infringement of the decalogue, one might well fall down and worship them, for verily to my knowledge there is nothing like them "in the heaven above, nor in the earth beneath, nor in the waters under the earth;" and they must serve to educate the young mind backward rather than forward.

With the study of our art from natural models, we could never allow ourselves to make the first superior bicuspidati smaller than the second, and the cuspidati of the same shade as the rest of the denture; we would not make the standard of excellence in a dental substitute a question of how evenly the cusps of the teeth would sit

upon a flat board; nor would we permit ourselves to use moulded gum-sections which make our patients' mouths look pretty much alike, varying only a little more or less in different degrees of ghastliness.

I sometimes think that our art could receive no better impetus than would be followed by the sudden destruction of every gum-section in the country; for then the profession would be compelled to furnish their own ideas on expression to their patients, while now, in consequence of inactivity in that direction, there has been great danger that if the present system of gum-sections continued they would have no ideas to furnish. It may be well to add, while we are on this subject, that I have already known, in New York City, of dentists leading their patients to the depôts and there allowing the patients to select from the trays the set of teeth that they most fancied, just as they would select a bonnet or a pair of boots.

Much has been said about the effect of rubber to bring dental art to its present degraded position. A paper like this is not the place in which to discuss various materials. That belongs more to the mechanical than the artistic department of our work, and art is too broad a subject to be ridden by hobbies or pet theories; still, it is only due in justice to say that through the process by which rubber is worked, it must produce a detrimental effect upon the advancement of anything artistic. The model is destroyed by the process of boiling that it undergoes in the vulcanizer, and all opportunity of future study of the case is thereby lost, and the lack of this opportunity for study very soon begets a lesser desire for study, so that men who are students are prone to turn away from a subject where ideality is likely to receive so little remuneration. But this subject is so vast, that in a paper like the present one must be content to merely call attention to the necessity of reconsidering a department that has long lain neglected, and whose neglect has degraded the profession as artists in the eyes of an intelligent public, without doing away with *their* necessity for a department of art whose requirements are but miserably fulfilled.